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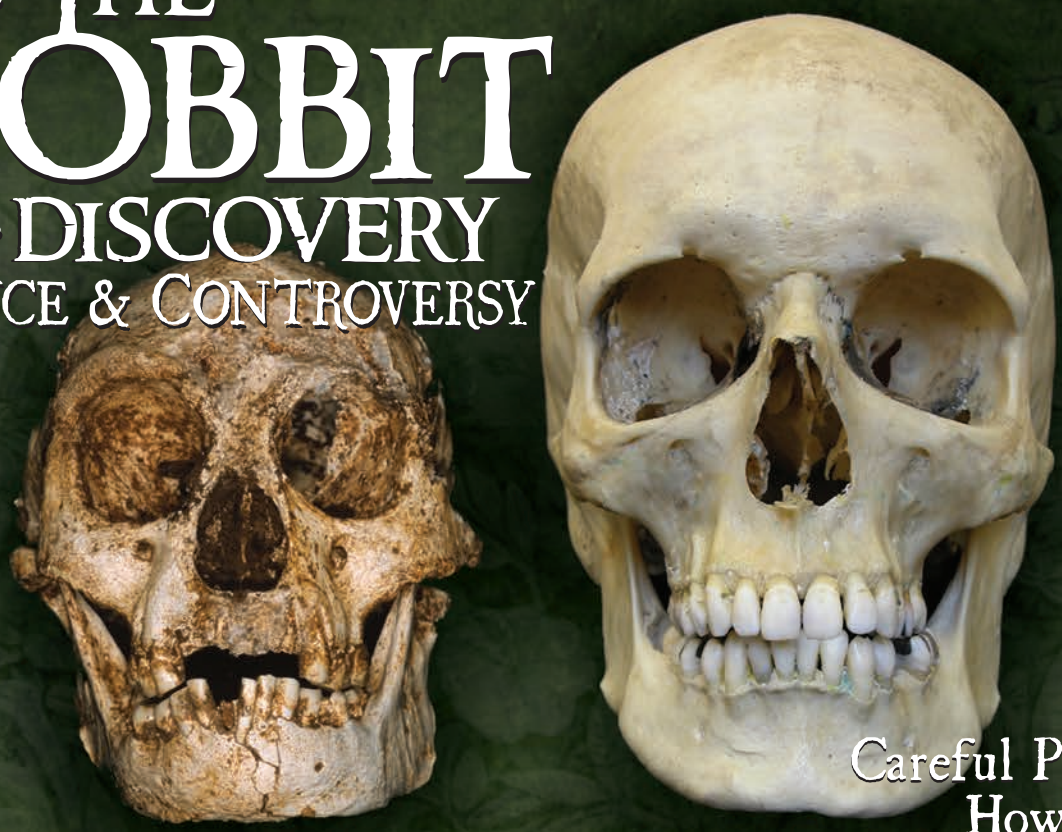
Science & Controversy



Careful Phrasing: How Words Influence Research

I Ching: Ambiguity & Obscurity

Chiropractic Dangers and Informed Consent

The Indigo Children: Saviors or New Age Bunkum?

CFI Twelfth World Congress

Published by the Committee for Skeptical Inquiry

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COVER: Skull of LB1 specimen of *H. floresiensis* from island of Flores, Indonesia, on left, compared with a modern human skull.

Editor's Note

Big Scientific Controversy over Little Hobbit People of Flores

Five years ago a stunning discovery on the Indonesian island of Flores rocked the field of paleoanthropology with both its unexpectedness and its potential impact on understanding the evolution of early humans and their dispersal across the planet. Here are the exact words the researchers used in *Nature* (October 24, 2004) to describe their find: "Here we report the discovery, from the Late Pleistocene of Flores, Indonesia, of an adult hominin with stature and endocranial volume approximating 1 meter and 380 cubic centimeters, respectively—equal to the smallest-known australopithecines. The combination of primitive and derived features assigns this hominin to a new species, *Homo floresiensis*. The most likely explanation for its existence on Flores is long-term isolation, with subsequent endemic dwarfing, of an ancestral *H. erectus* population."

The researchers included Peter Brown and M.J. Morwood of the University of New England in New South Wales, Australia, and T. Sutikna, R.P. Soejono, and three others from the Indonesian Centre for Archaeology in Jakarta. A companion paper by a team of these and other authors described the archaeological context of the remains, found in an excavation in a large limestone cave, Liang Bua.

Dating the remains showed that the population had lived on Flores as recently as 18,000 years ago. Nothing like this had ever been anticipated—a possible new species of hominin living in isolation simultaneously in time with modern humans. Only one other species of the genus *Homo* was known in Asia during the entire Pleistocene: *Homo erectus* was closer in size to us and is thought to have lived from 1.6 million to 250,000 years ago.

The evidence indicates that the tiny people of Flores hunted big game—including a dwarfed species of *Stegodon*—using spears and projectile points they had been making for thousands of years. Whether they interacted with modern humans is unknown.

The *H. floresiensis* people were quickly, almost inevitably, dubbed "hobbits," and the scientific controversy about them was on. Other researchers disputed that they could be a new species, contending their small stature and brain size were due to pathology. Other issues emerged, and the debates still rage. But the new-species view hasn't weakened.

In this issue Kenneth W. Krause provides a thoroughly researched, up-to-date report and synthesis of the entire matter—the discovery, the evidence, and the ensuing controversies. The subject is of immense scientific importance and also of considerable popular interest.

We usually deal in our pages with scientific discoveries after the fact—after the controversies about them in the scientific community are long settled yet where public controversy or ignorance still abounds. This will be the first substantive, full-length article we have published about a major scientific discovery and associated current controversy going on *within* science. It's something I think we should do occasionally. It gives a sense of how science actually works—its messiness, contentions, uncertainties, personalities, and disputes.

Author Krause has been in contact with the major players but admirably sticks close to the peer-reviewed scientific literature. The result is an authoritative and well-balanced account of a momentous scientific discovery and controversy. We are interested in your reaction.

—KENDRICK FRAZIER

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CSI's Balles Prize Goes to Physicist/Author Leonard Mlodinow

BARRY KARR

The Committee for Skeptical Inquiry has awarded its Robert P. Balles Annual Prize in Critical Thinking to Leonard Mlodinow for his book *The Drunkard's Walk: How Randomness Rules our Lives*, published in 2008 by Pantheon.

Leonard Mlodinow received his doctorate in physics from the University of California, Berkeley, was an Alexander von Humboldt fellow at the Max Plank Institute, and now teaches about randomness to future scientists at Caltech. He has written for the television series *MacGyver* and *Star Trek: The Next Generation*. His previous books include *Euclid's Window: The Story of Geometry from Parallel Lines to Hyperspace*, *Feynman's Rainbow: A Search for Beauty in Physics and in Life*, and, with Stephen Hawking, *A Brief History of Time*.

According to Mlodinow, "The Drunkard's Walk comes from a mathematical term describing random motion, such as the paths molecules follow as they fly through space, incessantly bumping and being bumped by, their sister molecules. . . . The surprise is that the tools used to describe the drunkard's walk can also be employed to help understand the events of everyday life. The goal of this book is to illustrate the role of chance in the world around us and to show how we may recognize it at work in human affairs."

Mlodinow was to be presented the award at a ceremony June 7, 2009, at the Center for Inquiry/Los Angeles.

The Robert P. Balles Annual Prize in Critical Thinking is a $1,300 award given to the author of the published work that best exemplifies healthy skepticism, logical analysis, or empirical science. Each year, the Committee for Skeptical Inquiry selects the paper, article, book, or other publication that has the greatest potential to create positive reader awareness of important scientific issues.

Photo © Marcio Fernandes

Leonard Mlodinow, 2008 recipient of the Committee for Skeptical Inquiry's Balles Prize.

CSI established the criteria for the prize, including use of the most parsimonious theory to fit data or to explain apparently preternatural phenomena.

This prize has been established through the generosity of Robert P. Balles, an associate member of CSI, and the Robert P. Balles Endowed Memorial Fund, a permanent endowment fund for the benefit of CSI.

This is the fourth year the Robert P. Balles prize has been presented. Previous winners of this award are:

2007: Natalie Angier, *New York Times* science writer and author of the book *The Canon: A Whirligig Tour of the Beautiful Basics of Science*

2006: Ben Goldacre for his weekly column, "Bad Science," published in *The Guardian* newspaper (U.K.)

2005: Shared by Andrew Skolnick, Ray Hyman, and Joe Nickell for their series of articles in the SKEPTICAL INQUIRER on "Testing 'The Girl with X-Ray Eyes'"

Nominations are now being accepted for 2009. Please send submissions to:

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CSI Solves New Jersey UFO Mystery

Strange, bright red lights appeared over Morris County, New Jersey, on January 5, 2009. They were first noticed in the night sky by an eleven-year-old girl, who pointed out three lights grouped together and another pair some distance away. The lights moved silently and slowly overhead, then disappeared one by one.

The girl's mother, Cindy Hurley, said it was "unsettling . . . something you've never seen before, and a very strange pattern." Paul Hurley, a pilot, said he was baffled: "I've been in aviation for twenty years and never seen anything like it." Police and the media fielded calls from alarmed residents; police eventually suggested that the lights were a hoax, but others dismissed that explanation as a weak cover-up.

I was asked by LiveScience.com to investigate the bizarre UFO lights. I consulted news sources, eyewitness ac-

counts, and video tapes of the lights. One day after the sightings I offered my analysis in a column posted at LiveScience.com, concluding that clues about the identity of the New Jersey UFO could be found in a case of identical lights seen over Phoenix, Arizona, the previous year.

On April 21, 2008, hundreds of Phoenix residents called police and local news media to report bright red lights hovering silently over the city. They changed shape after a while, moving from a triangular to rectangular configuration, and then disappeared one by one. As in the New Jersey case, the local airport reported that nothing appeared on radar scans of the area.

The fact that the two cases are identical in virtually every way suggested to me that the same type of UFO appeared. (Of course since UFOs don't have registration numbers painted on the fuselage, it was impossible to be certain, but eyewitness accounts were identical.) In the Phoenix case, the UFO became an IFO, an Identified Flying Object. It was a hoax created by road flares tied to helium balloons. The hoaxer admitted it, and eyewitnesses reported seeing him do it.

In both cases, all the evidence pointed to a hoax: the lights moved independently like floating objects, not fixed lights on an aircraft; they moved together in the same direction as the wind; they did not show up on radar; and the lights extinguished in exactly the pattern we would expect from flares, going out one by one. It's not surprising that eyewitnesses, including a pilot, could not identify the objects, since most people have not seen road flares tied to balloons in the night sky. There's no reason a pilot, or anyone else, would recognize it: the lights literally were nothing they had ever seen before—but not necessarily anything extraterrestrial.

Though I had laid out a detailed, point-by-point analysis showing that the New Jersey lights were almost certainly a copycat hoax, many were skeptical of the skeptics.

Some UFO buffs ridiculed the conclusion that this was a hoax, claiming that the movements of the lights ruled out the possibility of flares. One ill-informed writer stated that "thousands of eyewitnesses said they saw a giant, solid, triangular object fly over their heads."

The case was even profiled on the popular History Channel show *UFO Hunters*. Bill Birnes, the lead investigator (and publisher of *UFO Magazine*), also dismissed the flare explanation. According to the show, skeptics (including myself and the police) "say the unidentified flying object was nothing but flares—a theory *UFO Hunters* has already tested and proven implausible." The show was very influential, with many viewers accepting their conclusions without question.

A definitive solution to the mystery remained elusive until April Fool's day, when two college students, Chris Russo and Joe Rudy, admitted to the hoax. My skeptical explanation, dismissed by many UFO buffs and the *UFO Hunters* team, turned out to be correct in every detail. "We set out into the woods . . . carrying one helium tank, five balloons, five flares, fishing line, duct tape, and a video camera," the pair explained in an entry on the eSkeptic Web site. "After filling up one three-foot balloon with helium, we tied about five feet of fishing line to the balloon, secured the line with tape, then tied and taped the flare to the other end of the line. Once all five balloons were ready, we struck the . . . flares and released them into the sky."

Realizing that in the conspiracy-minded UFO community hoax admissions are suspect, they carefully documented their prank in a series of videos. For all but the outer fringe of UFO buffs who claim that those videos themselves were faked, their explanation is iron-clad and proven, case closed.

The pair said the hoax was a "social experiment on how to create your own media event surrounding UFO sightings . . .to show everyone how unreliable eyewitness accounts are, along with investigators of UFOs." On the *UFO Hunters* show, investigator Birnes and his team had concluded that "these lights are moving without any independent movement . . . you can almost make out a frame." Yet we know this analysis was completely wrong: the lights were in fact moving independently, and there was no frame at all, triangular or otherwise. As Russo and Rudy note, "If a respected UFO investigator can be easily manipulated and dead wrong on one UFO case, is it possible he's wrong on most (or all) of them?"

The incident inspired a spirited debate on the CFI blogs about whether skeptics should pull hoaxes to prove a skeptical point. Rudy and Russo pled guilty to creating a disturbance and in April were each fined $250 and each sentenced to perform fifty hours of community service. From red lights in the sky to red faces at the History Channel, this solved UFO case proves that you can't always believe what you see, either in the skies or on TV.

—Benjamin Radford

Benjamin Radford is an investigator and SI's "Skeptical Inquiree" columnist.

Nonreligious Portion of U.S. Population Growing, Survey Finds

What many secularists have long been contending—that their numbers in American society are growing and have consistently been underestimated in the public awareness—has been confirmed by a new survey of religious belief in America. The survey shows that secularism continues to grow in strength in all regions of the country.

The third in a series of American Religious Identification Surveys (ARIS), carried out by the Program on Public Values at Trinity College in Connecticut, contained results that might surprise those who maintain that the United States has become an increas-

ingly religious society.

The 2008 ARIS survey, reported in March 2009, found a consolidation and strengthening of shifts reported in the 2001 survey. Specifically, the percentage of Americans claiming no religion, which jumped from 8.2 in 1990 to 14.2 in 2001, has now increased to 15 percent.

In fact, given the estimated growth of the American adult population since the last census from 207 million to 228 million, that reflects an additional 4.7 million "Nones," say survey authors Barry Kosmin and Ariela Keysar. They are director and associate director, respectively, of Trinity's Institute for the Study of Secularism in Society and Culture.

"The most significant influence on American religious geography over time has been the increase in the Nones, or No Religion bloc," the authors say. "Nationally the Nones more than doubled in numbers from 1990 to 2008 and almost doubled their share of the adult population, from 8 percent in 1990 to 15 percent in 2008." Moreover, they report, "The Nones increased in numbers and proportion in every state, census division, and region of the country—from 1990 to 2008. No other religious bloc has kept such a pace in every state."

Northern New England has now taken over from the Pacific Northwest as the least religious section of the country, with Vermont, at 34 percent "Nones," leading all other states by a full five points. Other leading "None" states: New Hampshire (29 percent), Wyoming (28 percent), and Maine (25 percent). Washington State is also at 25 percent, with Oregon and Nevada at 24 percent. Idaho and Delaware are at 23 percent, and Colorado is at 21 percent. The leading "None" state in the South is Kentucky, at 13 percent. All these represented marked increases since 1990.

"Many people thought our 2001 finding was an anomaly," Keysar said. "We now know it wasn't. The 'Nones' are the only group to have grown in every state of the Union."

Why the public perception that the nonreligious are a tiny fraction of the population? Much of it has to do with the words and categories used in describing those who hold various nonreligious viewpoints. The labels "atheist" and "agnostic" may still be shunned, including by those who adhere to them, but the beliefs they represent are growing.

For instance, the new survey found that only 1.6 percent of Americans call themselves atheist or agnostic. But it found, based on Americans' stated beliefs, that 12 percent are atheist (no God) or agnostic (unsure), while 12 percent are deistic (believe in a higher power but not a personal God). Thus the percentage of the population that believes in no god or at least no personal god has reached 24 percent, nearly a quarter of the population. And the number of outright atheists has nearly doubled since 2001, from 900,000 to 1,600,000.

One sign of the lack of attachment of Americans to religion, say the survey authors, is that 27 percent of Americans do not expect a religious funeral upon their death.

What seems to be happening is a polarization, with nonbelief growing on one end of the spectrum and Christian evangelicalism growing on the other end, with mainstream Protestant Christian denominations in the middle continuing to shrink. Yet Christian belief overall, while still held by the majority, also continues to decline.

The survey found that the percentage of Christians in America, which declined in the 1990s from 86.2 percent to 76.7 percent, has now edged down to 76 percent. Ninety percent of the decline comes from the non-Catholic segment of the Christian population, largely from the mainline denominations, including Methodists, Lutherans, Presbyterians, Episcopalians/Anglicans, and the United Church of Christ. These groups, whose proportion of the American population shrank from 18.7 percent in 1990 to 17.2 percent in 2001, all experienced sharp numerical declines this decade and now constitute just 12.9 percent.

Most of the growth in the Christian population occurred among those who would identify only as "Christian," "Evangelical/Born Again," or "non-denominational Christian." Thirty-four percent of American adults considered themselves "Born Again or Evangelical Christians" in 2008. The "non-denominational Christian" category, associated with the growth of mega-churches, has increased from less than 200,000 in 1990 to 2,500,000 in 2001 to over 8,000,000 today. These groups grew from 5 percent of the population in 1990 to 8.5 percent in 2001 to 11.8 percent in 2008. Significantly, the survey found, 38.6 percent of mainline Protestants now also identify themselves as evangelical or born again.

"It looks like the two-party system of American Protestantism—mainline versus evangelical—is collapsing," said Mark Silk, director of the Public Values Program. "A generic form of evangelicalism is emerging as the normative form of non-Catholic Christianity in the United States."

A few other key findings:

- The center of Catholicism in the United States has shifted from the Northeast to western and southwestern states strongly affected by immigration of Hispanics. Between 1990 and 2008, the Catholic population proportion of New England states fell from 50 to 36 percent and in New York it fell from 44 percent to 37 percent, while it rose in California from 29 percent to 37 percent and in Texas from 23 percent to 32 percent.
- Baptists, who constitute the largest non-Catholic Christian tradition, have increased their numbers by two million since 2001 but continue to decline as a proportion of the population.
- Those who identify religiously as Jews continue to decline numerically, from 3.1 million in 1990 to 2.8 million in 2001 to 2.7 million in 2008—1.2 percent of the population. Defined to include those who identify as Jews by ethnicity alone, the American Jewish population has remained stable over the past two decades.

The survey was conducted between February and November 2008. ARIS used the same research methodology for its 1990 and 2001 surveys. It questioned 54,461 adults in English or Spanish. ARIS says the survey has a margin of error of less than 0.5 percent, and "it provides the only complete portrait of how contemporary Americans identify themselves religiously, and how that self-identification has changed over the past generation." For further details: www.americanreligionsurvey-airs.org.

—Kendrick Frazier

Kendrick Frazier is the editor of the SKEPTICAL INQUIRER.

Obama on Science, Discovery, and Open Inquiry

Here are excerpts from a talk by President Barack Obama to the National Academy of Sciences, Washington, D.C., April 27, 2009:

A half century ago, this nation made a commitment to lead the world in scientific and technological innovation; to invest in education, in research, in engineering; to set a goal of reaching space and engaging every citizen in that historic mission. That was the high water mark of America's investment in research and development. Since then our investments have steadily declined as a share of our national income—our GDP. As a result, other countries are now beginning to pull ahead in the pursuit of this generation's great discoveries.

I believe it is not in our American character to follow—but to lead. And it is time for us to lead once again. I am here today to set this goal: we will devote more than three percent of our GDP to research and development. We will not just meet, but we will exceed the level achieved at the height of the Space Race, through policies that invest in basic and applied research, create new incentives for private innovation, promote breakthroughs in energy and medicine, and improve education in math and science. This represents the largest commitment to scientific research and innovation in American history. . . .

The pursuit of discovery half a century ago fueled our prosperity and our success as a nation in the half century that followed. The commitment I am making today will fuel our success for another fifty years. That is how we will ensure that our children and their children will look back on this generation's work as that which defined the progress and delivered the prosperity of the 21st century.

* * *

. . . My administration is already providing the largest single boost to investment in basic research in American history. . . .

We double the budget of key agencies, including the National Science Foundation, a primary source of funding for academic research, and the National Institute of Standards and Technology, which supports a wide range of pursuits. And my budget doubles funding for the Department of Energy's Office of Science, which builds and operates accelerators, colliders, supercomputers, high-energy light sources, and facilities for making nano materials. . . .

* * *

And today, I am also announcing that for the first time, we are funding an initiative—recommended by this organization—called the Advanced Research Projects Agency for Energy, or ARPA-E. This is based on the Defense Advanced Research Projects Agency, known as DARPA, which was created during the Eisenhower administration in response to Sputnik. It has been charged throughout its history with conducting high-risk, high-reward research. The precursor to the Internet, known as ARPANET, stealth technology, and the Global Positioning System all owe a debt to the work of DARPA.

ARPA-E seeks to do this same kind of high-risk, high-reward research. My administration will also pursue comprehensive legislation to place a market-based cap on carbon emissions. We will make renewable energy the profitable kind of energy in America. And I am confident that we will find a wellspring of creativity just waiting to be tapped by researchers in this room and entrepreneurs across our country.

* * *

We are restoring science to its rightful place. On March 9th, I signed an executive memorandum with a clear message: Under my administration, the days of science taking a back seat to ideology are over. Our progress as a nation—and our values as a nation—are rooted in free and open inquiry. To undermine scientific integrity is to undermine our democracy. That is why I have charged the White House Office of Science and Technology Policy with leading a new effort to ensure that federal policies are based on the best and most unbiased scientific information. I want to be sure that facts are driving scientific decisions—and not the other way around.

* * *

And so today I want to challenge you to use your love and knowledge of science to spark the same sense of wonder and excitement in a new generation. America's young people will rise to the challenge if given the opportunity—if called upon to join a cause larger than themselves. And we've got evidence. The average age in NASA's mission control during the Apollo 17 mission was just twenty-six. I know that young people today are ready to tackle the grand challenges of this century. . . .

So I want to persuade you to spend time in the classroom, talking—and showing young people what it is that your work can mean, and what it means to you. Encourage your university to participate in programs to allow students to get a degree in scientific fields and a teaching certificate at the same time. Think about new and creative ways to engage young people in science and engineering, like science festivals,

robotics competitions, and fairs that encourage young people to create, build, and invent—to be makers of things.

And I want you to know that I'm going to be working alongside you. I'm going to participate in a public awareness and outreach campaign to encourage students to consider careers in science, mathematics, and engineering—because our future depends on it. And the Department of Energy and the National Science Foundation will be launching a joint initiative to inspire tens of thousands of American students to pursue careers in science, engineering, and entrepreneurship related to clean energy.

* * *

At root, science forces us to reckon with the truth as best as we can ascertain it. Some truths fill us with awe. Others force us to question long held views. Science cannot answer every question; indeed, it seems at times the more we plumb the mysteries of the physical world, the more humble we must be. Science cannot supplant our ethics, our values, our principles, or our faith, but science can inform those things and help put these values, these moral sentiments, that faith, to work—to feed a child, to heal the sick, to be good stewards of this earth.

We are reminded that with each new discovery and the new power it brings comes new responsibility; that the fragility and the sheer specialness of life requires us to move past our differences, to address our common problems, to endure and continue humanity's strivings for a better world.

As President Kennedy said when he addressed the National Academy of Sciences more than forty-five years ago: "The challenge, in short, may be our salvation."

John Maddox, Longtime *Nature* Editor and CSI Fellow, Dies

John Maddox, a pivotal figure in the world scientific community as twice editor of the esteemed scientific journal *Nature*, died April 12 at the age of eighty-three. He was a steadfast defender of good science and clear scientific communication and an equally strong opponent of scientific misconduct and pseudoscience.

"I am most sorry to learn of Sir John's death," says Committee for Skeptical Inquiry founder and chairman Paul Kurtz. "He was a strong supporter of our efforts." Maddox was a CSICOP (now CSI) fellow, and he participated in CSICOP world congresses in Seattle in 1994 and Amherst in 1996. In Seattle he received CSICOP's Public Education in Science Award.

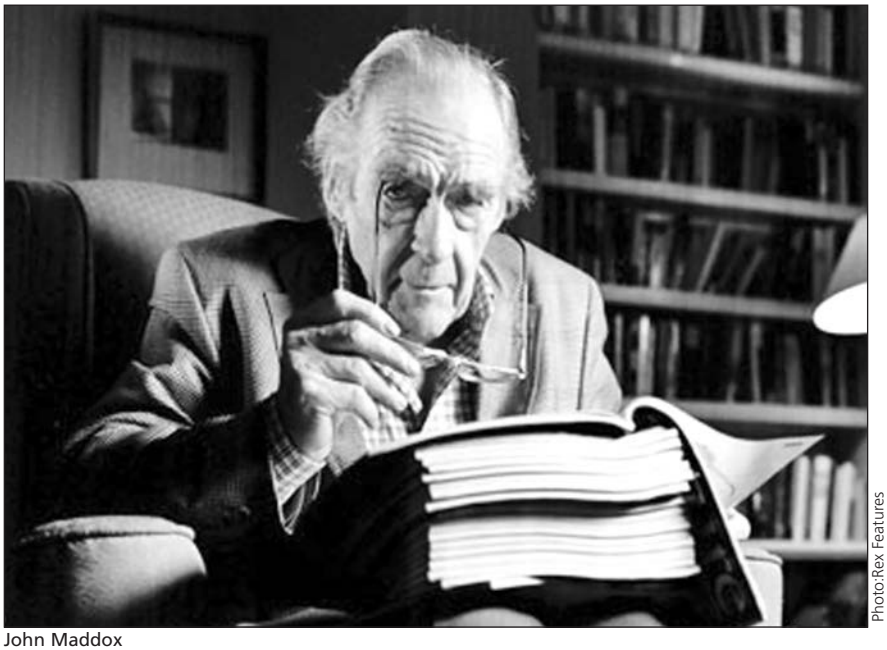

Photo:Rex Features

John Maddox

Maddox was born in Wales and trained in physics at King's College, London. He taught theoretical physics at the University of Manchester from 1949 to 1955 before becoming the science correspondent for the *Manchester Guardian* (now *The Guardian*). He came to *Nature* in 1966, where he found the venerable, nearly century-old weekly journal (founded in 1869) with a tiny staff and in much need of revitalization. That's what he did. He waded through a backlog of more than two thousand articles he found in fourteen monthly piles. Within two weeks he instituted a refereeing system and began refusing manuscripts "on the strength of negative opinions or their sheer length."

He determined to make *Nature* newsier and more topical and so began writing leading articles (editorials and news), often just as the weekly deadline loomed. He hired the first of a team of science news correspondents. He actively sought out important papers. Over the years, *Nature* became *the* place to publish cutting-edge scientific discoveries.

"He took command of *Nature* in a big way," says evolutionary biologist Richard Dawkins. "He had a tremendous grasp of science in the full range, from physics to biology, to public affairs as they affected the world of science."

Maddox actually served two stints as editor of *Nature*, 1966–1973 and 1980–1995. Upon his retirement in 1995, he wrote a typically lively and candid "Valediction from an Old Hand" (378:52, December 7, 1995) about his experiences and the state of science publication. Among other things, he condemned the rise of scientific misconduct. Yet he found "the extreme cases of fraud" less alarming than pressures to publish. "If we agree that successful people publish a great deal because they have a lot to say, does it follow that people who publish a great deal are success-

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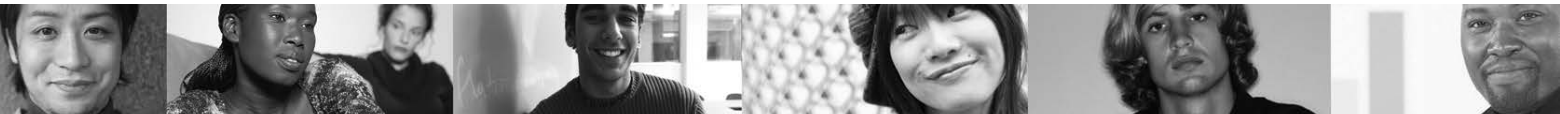
Toni Van Pelt, Paul Kurtz, and Ron Lindsay (standing); Lawrence Krauss, David Helfland, and Nobel Laureate Paul Boyer (seated) introduced the Declaration in Defense of Science and Secularism at the inaugural press conference of the Center for Inquiry/Office of Public Policy in Washington, D.C.

Local leaders, campus activists, and students from around the world came together at CFI's Summer Session.

Latin American and U.S. skeptical activists met at the CFI-sponsored First Iberoamerican Conference on Critical Thinking in Peru.

The new Naturalism Research Project will more than double our library facilities and create a collegial setting for scholarly dialogue and research.



ful? Of course not. . . . It is hard to avoid the conclusion that most of what is published need not be published urgently, or where it appears, or even at all."

He also revealed that "for different reasons," he exempted two noted scientists from having their papers sent to referees. One was Louis Leakey, whom Maddox found provoked "otherwise reasonable colleagues" from wrongly declaring his papers not to be publishable and contending "that he should spend the next three years working systematically through the fossils already stored in his many tea-chests; we would have missed much excellent paleoanthropology if we had listened to them." The other was Fred Hoyle, "who during the 1950s and 1960s entertained and instructed readers of *Nature* on matters as different as the structure of Stonehenge and the nature of the Universe. Most referees found him 'unsound,' often without saying why. . . . There remains a place for the occasional unrefereed article."

In 1988 Maddox published an article by French researcher Jacques Benveniste that seemed to show that a histamine reaction could take place even after the solution had been diluted many billions of times, a claim of water's ability to "remember" an antibody's presence even though it could no longer be there. But publication was granted only on an unprecedented condition—that a team of investigators, including magician/investigator James ("The Amazing") Randi and Maddox himself, could soon thereafter visit Benveniste's lab and observe how the experiments were done. The work didn't stand up, and Maddox then published a blistering condemnation of the research.

Upon his retirement, Maddox was knighted and named an honorary fellow of the Royal Society. Maddox's 1998 book *What Remains to Be Discovered* was an informed exposition on what we don't yet know across the physical, biological, and neurological sciences.

Maddox was a lifetime advocate of clear and pungent scientific exposition, the lack of which among scientists continually frustrated him. "It used to seem that *Nature*'s contributors wrote clearly, but no longer," he complained in his valedictory article. Yes, science has become more intricate "but not so much as to justify the obscurity of scientific texts. . . . The obscurity of the literature now is so marked that one can only believe it to be deliberate. Do people hide their meaning from insecurity, for fear of being found out, or, in the belief that what they have to say is important, to hide the meaning from other people?"

He thanked "a host of readers and contributors for correspondence that has always been illuminating and often entertaining."

—Kendrick Frazier

A Tribute to Jerry Andrus—Magician, Creator of Master Illusions

Jerry Andrus—master magician and creator of innovative illusions—died peacefully August 26, 2007. He was a Committee for Skeptical Inquiry fellow.

Jerry was born in Sheridan, Wyoming, January 18, 1918, and moved with his family to Oregon when he was seven years old. For almost eighty years he lived in the house that he aptly called "The Castle of Chaos." During World War II, he served four years in the Army, some of that time in France and Germany. When he returned to civilian life he earned his living as a power lineman. He left that career when he was around fifty years old, unable to tolerate what he considered hypocrisy in both the union and management.

Jerry Andrus

The preceding account fails to explain how Jerry became one of the world's most innovative magicians—one who could consistently fool the best magicians. He also invented optical illusions that today are displayed in science museums around the world. He was a prolific writer of poetry, a philosopher, and a gadfly. He was a polymath. We probably cannot explain how a man growing up in the logging town of Albany, Oregon, with only a high school education could have successfully innovated so many fields as well as been invited to lecture at Harvard, the Massachusetts Institute of Technology, and many other intellectual powerhouses.

Perhaps a key to Jerry's remarkable personality can be found in a revelation he had when he was twelve. While Jerry was walking home from school, he suddenly asked himself, "How come when our school wins a sporting competition, we cheer and bask in the reflected glory? However, when the other school wins, we accuse them of cheating. What if I were going to the other school? What would I think?" This incident began Jerry's lifelong quest to unmask human foibles and to promote reason as the way to achieve a world in which humans respect one another.

As a result of questioning and the persistent application of reason, Jerry became an atheist. He delighted in debating with those who differed with him in their fundamental beliefs. At the same time, Jerry always respected other people and was careful not to belittle or otherwise put them down. Jerry had many lifelong and close friends who loved and admired him

even though they disagreed with him on almost every important issue.

I first encountered Jerry at a magic convention in Hartford, Connecticut, in 1956. The other magicians in attendance, including me, had recently heard of Jerry because he had marketed his magic routine *The Linking Pins* in 1954 and had just published his now-classic *Andrus Deals You In.* Because Jerry performed and published only magic that he had invented without the input of other magicians, his sleights and methods were so unusual that the major magicians had already dismissed them as unrealistic and unworkable. So when Jerry performed his magic for the magicians at the convention, they were completely baffled. He fooled every one of us—and he fooled us badly. From that day Jerry became a legend among magicians.

Jerry and I became very close friends after I moved to Eugene, Oregon, in 1961. Our mutual friend Martin Gardner phoned Jerry and told him I had moved into his neighborhood. He urged Jerry to contact me. Jerry did. Thanks to Martin, I had the very good fortune to share almost half a century with one of the most remarkable individuals who ever lived.

Jerry Andrus is too complex to capture in words, let alone a short tribute such as this. You can find out more about him at the Web site www.jerryandrus.org. Two excellent documentaries, each in a different way, capture some of the essence of Jerry. You can obtain DVDs of each of these at the following Web sites: www.archmotion.com and www.skepticalmedia.com. Finally, for those magicians who are reading this, Meir Yedid (www.mymagic.com) markets a set of DVDs that feature Jerry performing and explaining his best magic.

—Ray Hyman

Ray Hyman is emeritus professor of psychology at the University of Oregon and is himself a magician and expert in the psychology of deception.

Michael Dennett, Skeptic and Bigfoot Investigator, Dies

Michael Dennett, who headed the Seattle area skeptics group Society for Sensible Explanations for over two decades, died May 2, 2009; he was fifty-nine years old. He had been diagnosed with leukemia and hospitalized for several months.

Photo: Michael Dennett

Michael Dennett

Mike was an investigative writer perhaps best known to SKEPTICAL INQUIRER readers for his research into Bigfoot, on which his first feature-length article was published in 1981. He was one of the first skeptical investigators to challenge Bigfoot claims, doing research into claims of dermal ridges ("Bigfoot fingerprints") and hoaxed tracks. He was a meticulous researcher, a careful investigator, and a true skeptic who called out fakery and pseudoscience when he saw it but was careful not to belittle or criticize people for their beliefs.

Dennett's research went far beyond Bigfoot, and he wrote about topics as varied as firewalking, the Bermuda Triangle, UFOs, the Salem witch trials, and psychics. He also contributed to *Psychic Sleuths*, *The Encyclopedia of the Paranormal*, *The Outer Edge*, and other books.

Born June 20, 1949, Mike was a 1971 graduate of Norwich University and a former Army Captain, paratrooper, and Ranger. Though his day job was selling municipal water systems, his academic loves were history, skepticism, and writing alternative-history science fiction. He is survived by his wife, Lois. His final article, "Science and Footprints" (about contradictions in accounts of the 1967 Patterson/Gimlim film, the "best evidence" for Bigfoot), was published in the November/December 2008 SKEPTICAL INQUIRER.

Borneo's River Monster Photo: Living Legend or Hoax?

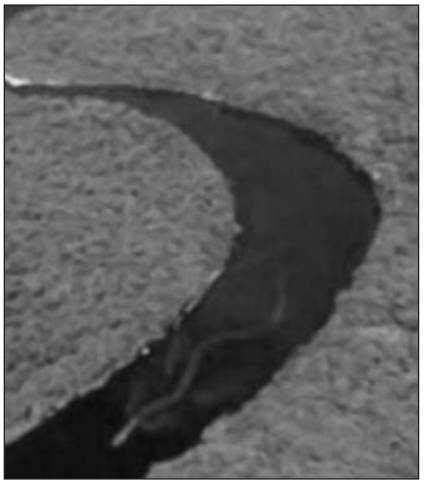
In February, two photographs of a huge snake-like creature allegedly taken in Borneo made international news. On February 19, *The Daily Mail* (U.K.) published a story that began:

> According to legend, the Nabau was a terrifying snake more than 100ft in length and with a dragon's head and seven nostrils. But now local villagers living along the Baleh river in Borneo believe the mythical creature has returned after a photo of a gigantic snake swimming along the remote waterways has emerged. The picture, taken by a member of a disaster team monitoring flood regions by helicopter, has sparked a huge debate about whether the photos are genuine or merely the work of photo-editing software. . . . Villagers who claim to have seen the snake say they have given it the name of Nabau, after an ancient sea serpent which can transform itself into the shapes of different animals.

I was asked by editors at LiveScience .com to examine the photos and the story behind them. One of the first things that struck me was how the photographs were given credence by references to local legends and folklore. Linking modern photographs and eyewitness reports to native stories and legends is a common mistake among those who search for mysterious creatures such as Bigfoot or lake monsters (for example, native Indian stories in British Columbia, Canada, tell of a fearsome

water spirit named Naitaka said to dwell in Lake Okanagan, which gave rise to reports of a monster there called Ogopogo; see "Ogopogo the Chameleon," SI January/February 2006).

The photos themselves were suspicious for several reasons, not the least of which was that they were taken by an unnamed "member of a disaster team" at an unknown location and date. Two photos were released; one was taken from a helicopter, the second one wasn't, suggesting that the creature was sighted on two separate occasions. That raises the question as to why there are only two photos; one might expect that a person seeing such an extraordinary creature might snap more than one picture each time.



This photo supposedly depicts the Borneo monster.

There's also the interesting composition of the photos: the snake-like creature seems to be posing full-length for the camera. In the aerial photo, it is nicely centered in the middle of the river, and in the other photo it is just high enough above the rooftops in the foreground to see its full length. If the huge beast spends its time in such high-visibility areas, why is this the first time it's been reported or photographed?

Furthermore, the reported size of the creature cannot be correct. The original estimate given was that the creature was 100 feet long, though the scale of the photos suggest it must be far larger. Then there's the question of whether the photo was even taken at the Baleh River, since most photographs of its waters show it to be a cloudy river, not the clear, dark-blue river seen in the aerial photo. If the photo was actually taken by a disaster team member checking on flooded regions, the flooding runoff would increase the suspended particulates in the water (silt, debris, etc.), creating even cloudier water than usual.

Based on these analyses and others, I reported back to LiveScience that the photos were most likely fakes and that the world would have to wait for conclusive evidence of lake or river monsters. The photo was soon discovered to have been created for the photo-manipulation Web site Worth1000.com (www.worth1000.com/stories/stats.asp?uid=2361&display=photoshop).

—Benjamin Radford

Crystal Balls in Chains

Fortune teller Janet Adams preyed on the fears of an elderly San Mateo, California, woman to the tune of more than $80,000. Adams's tarot cards neglected to tell her she might get caught. In March, she was sentenced to six years in prison after pleading no contest in a deal with prosecutors to a felony count of fiscal elder abuse.

To stave off her husband's predicted fatal heart attack, the elderly woman initially forked over $13,000 to Adams for "special prayers" to avert disaster. Over the next ten months, the psychic wrangled more money from the victim, lying about her allegedly sick son and claiming her own husband was in the hospital dying. Adams even asked the woman to cover her husband's funeral expenses.

Adams's apology to her victims didn't stop the judge from calling her despicable or requiring her to pay over $300,000 in restitution. She didn't just prey on the elderly. Adams liked vulnerable recovering alcoholics too—a relapsing woman went to the psychic during a difficult period and ended up being billed for $3,000 during her first visit for prayers for her husband and two children. Over the next few months the victim gave Adams about $1,000, for which the she received special candles, crystals, and some prayers. Four of Adams's victims testified against her during her trial.

This isn't the first trip to jail for Adams, who sold crystals and visions out of her store in a local shopping center. She was convicted of perpetrating fraud on a nineteen-year-old woman for $15,000 at a pumpkin fair in Half Moon Bay in 2003. She never paid the $20,000 in restitution ordered by the court. Her most recent victims aren't likely to see one red cent either.

In December of 2008, police reported that Gina Marie Marks, also known as Regina Milbourne, allegedly scammed five people out of $65,000. She is nowhere to be found. Given the number of empty storefronts in economically strapped shopping malls and the relative ease of renting such a space, Marks/Milbourne is sure to materialize out of thin air with a new identity and new victims.

Also last year, the IRS charged a Chicago tarot card reader with tax evasion. This particular schemer received cash and jewelry because she made her clients think they were cursed. Apparently, the fortune teller didn't sense the long arm of the IRS reaching "through the veil" for her.

Gina Reed, an Arlington Heights, Illinois, woman, was charged with theft in December 2008 when several victims alleged she stole $10,000 for driving away evil spirits, which Reed promised to return to her clients when the evil spirits departed. Instead, Reed departed with the cash after she blessed the house. She now faces two to five years in prison.

—Donna Danford

Donna Danford is an assistant editor for the SKEPTICAL INQUIRER.

CENTER FOR INQUIRY
12th WORLD CONGRESS 2009
SCIENCE, PUBLIC POLICY, AND THE PLANETARY COMMUNITY

Highlights of CFI's Twelfth World Congress 'Science, Public Policy, and the Planetary Community'

KENDRICK FRAZIER

The Center for Inquiry's 12th World Congress in Washington (Bethesda, Maryland, actually) was grandly yet appropriately titled "Science, Public Policy, and the Planetary Community." In one way or another it covered just about every topic CFI and its affiliated organizations the Committee for Skeptical Inquiry (publisher of the SKEPTICAL INQUIRER) and the Council for Secular Humanism (publisher of *Free Inquiry*) deal with.

Everyone seemed to enjoy it. The day afterward, CFI founder and chairman Paul Kurtz called the congress "exhilarating." As he said, "The responses of our readers and supporters were overwhelmingly positive. What a stunning response that we received from them!" Ron Lindsay, CFI's CEO and president, likewise called the conference very successful and said many attendees commented favorably to him "that they noticed the skeptical/scientific side of our organization was on display more than usual, which they appreciated."

That's true, I think. Many people in the audience told me at various times how much they appreciate and value the SKEPTICAL INQUIRER. SI and its articles and the work of the Committee for Skeptical Inquiry got a lot of *public* mention, too, in the talks, intros, and sessions.

Here are a few highlights for me:

• The opening session on Darwin and Lincoln, evolution, ID and creationism, and legal challenges of church-state separation involving the latter. Civil rights lawyer and CFI board member Edward Tabash emphasized repeatedly that in opposing creationism, we are "fighting not religious belief but the infusion of religious doctrine into public policy." Philosopher/historian Barbara Forrest updated developments in the intelligent design wars since the Dover decision in 2005, including the latest troubling activities of antievolutionists in Texas and Louisiana. And Lincoln/Darwin historian David Contosta said: "I am convinced Lincoln was a deist. He did not believe in the divinity of Christ. He was not baptized. He questioned miracles of the Bible. He liked to tell jokes about preachers. . . . He probably couldn't get elected today."

Photo: Brian Engler

Former Congresswoman Patricia Schroeder gave an invigorating talk at CFI's World Congress.

• Former twelve-term U.S. Congresswoman Patricia Schroeder's rousing talk defending good science against political indifference and, worse, interference. Her lively title tells the story: "The United States, a Former Global Leader in Science, Apologizes for the 2001–2008 Service Outage." In her current job she represents textbook publishers for grades K–12. She warned that only a handful of people pick the textbooks your children use. "They are not teachers, usually. They are scary people, some of them." She lamented that just the previous week in Texas opponents of evolution in textbooks declared an "insufficiency of evidence" for natural selection.

• Author Susan Jacoby's (*The Age of American Unreason*) litany of "anti-intellectualism and sheer intellectual laziness" in America over the past forty years. "We are in serious intellectual trouble. We don't value knowledge enough." She gave a long series of examples of what she calls "junk thought," ideas that are "impervious to evidence." She also defended the virtues of reading, a practice much marginalized in today's hectic age of instant electronic communications.

• Paul Kurtz's luncheon address on the planetary perspective. He said humanism includes genuine caring for others and a respect for the dignity and value of every person on the planet. "We have common ground with all members of the human family." He said we need a new planetary ethic that mitigates human suffering and increases the sum of human good and happiness. "As skeptics and rationalists, we need to cultivate a new planetary ethic. We need to be

concerned with the planet Earth. It seems to me that is the positive statement of humanism."

• Astrophysicist John Mather's (the first NASA scientist to win the Nobel Prize) beautifully illustrated talk on the entire history and future of the universe, from its origin in the "Horrendous Space Kablooey" (as he calls the Big Bang) 13.7 billion years ago to the time when the Sun goes out 7.6 billion years from now . . . and beyond. He reported on the 1998 discovery that the cosmic expansion is accelerating, the mystery of dark energy, the plans for the next big space telescope to be launched in 2013 (the James Webb Space Telescope), and the quest to directly observe more exoplanets. Cosmology may have no practical benefits, he said, but space science sure does. People often forget that their weather reports, GPS devices, telephones, and television all "depend on things out there in space."

• NASA climatologist Drew Shindell's full report on "The Science of Climate Change." He noted that our knowledge of climate change comes from detailed scientific observations, and he reviewed the interplay and repeated testing that goes on between scientific observations and computer models of climate. Some conclusions: the planet is getting warmer, *natural* forcings (solar variation, volcanoes, etc.) have been flat in recent years, the twentieth-century warming is largely caused by greenhouse gas increases, and the rate of future warming is likely to increase. He noted that apathy and resistance to change in this area goes back to the 1840s when a smokestack-cleaning technology for ships of the Royal Navy was squelched by industry.

• James Randi's lively participation in many sessions, hallway discussions, and his own late afternoon talk about how easily we all can be fooled. "I know the art of deception. I know how people are fooled. And I know how to do that." He described repeated examples of very smart people being fooled by trickery. "You can be fooled as well," he said. It's the conjuror's warning not to take at face value any proclaimed evidence of psychic powers. At the end, Randi announced that his famous one-million-dollar challenge to claimants for proof of paranormal powers under controlled test conditions, which was to end, will in fact be renewed. "It was going to terminate in 2012," he said, "but now it will continue."

• Major awards to Paul Kurtz, Randi, and Lawrence Krauss (see story below).

• A session I moderated on Skepticism and Science seemed well received (due especially to the presentations by the witty and lively Richard Wiseman, with lots of video demos on perception and misperception, and equally so Elizabeth Loftus, with her research demonstrating false memory, plus Joe Nickell, on investigating rather than just debunking, and Armadeo Sarma, on alternative medicine fads in Germany and the rest of Europe).

• A small lunch given by Paul Kurtz for international participants in the congress, including the Chinese delegation (where we were able to renew acquaintances with several of the Chinese colleagues we met in Beijing in October 2007) and those from the U.K., Germany, the Netherlands, France, Russia, India, Pakistan, and Senegal.

• A lively audience-participation, packed-house session at the end of the afternoon Saturday on The Future of Skepticism. Run by Ben Radford and myself, I gave some introductory comments. Barry Karr and James Underdown also participated. Sean McCabe of the James Randi Educational Foundation (he also writes a skeptical blog for the general public at www.weird-things.com) emphasized the positive messages of skepticism, noting that there are now nine network TV shows featuring scientists or science oriented. Proclaimed McCabe: "Skepticism is cool . . . and it's getting cooler." We then opened it to the audience. A lot of good ideas and discussion came out of the session.

• A sobering presentation by Pakistani nuclear physicist Pervez Hoodbhoy on the very recent Talibanization of Pakistan, even in Islamabad, where he teaches at a university. It has become very dangerous, he said. Terrible things have begun happening there in just the past several months. (The day after the conference ended, news organizations reported the imposition of Islamic law by the Taliban in the Swat Valley of Pakistan. Further Taliban inroads have prompted subsequent military action.)

• The Saturday evening awards banquet featured a live oratorio of composer Richard Einhorn's new original composition (personally introduced by Einhorn) "The Origin," a celebration of the life and work of Darwin based on Darwin's own words in *On the Origin of Species.*

• Awards banquet speaker Lawrence Krauss's (a CSI fellow and Arizona State University physicist and author) talk on "Science and Public Policy: An Oxymoron." He concluded with the call, "We must all become evangelists for science. We cannot tolerate unambiguous nonsense in a democracy."

Kendrick Frazier is editor of the SKEPTICAL INQUIRER.

Randi, Krauss, Kurtz Honored with Major Awards

James Randi, Lawrence Krauss, and Paul Kurtz were honored with major awards at the Center for Inquiry's 12th World Congress in Bethesda, Maryland. All were presented at the Saturday evening awards banquet, April 11.

* * *

James Randi received the Committee for Skeptical Inquiry's **In Praise of Reason Award** "in recognition of his distinguished contribution to the use of critical inquiry, scientific evidence, and reason in evaluating claims to knowledge."

As everyone knows, Randi has for decades been a tireless and charismatic critical investigator of those who claim paranormal powers, forthrightly chal-

lenging them to undergo testing under controlled conditions and exposing those who intentionally deceive others. He also has been an effective educator of the scientific and skeptical communities about the need to understand the methods magicians use to deceive, so as not to be deceived themselves by pretenders to psychic powers.

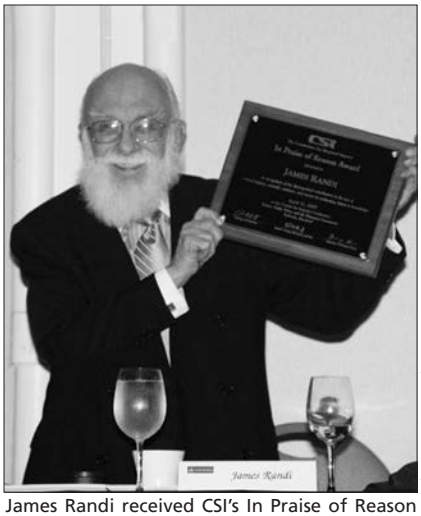


Photo: Brian Engler

James Randi received CSI's In Praise of Reason Award at the Twelfth World Congress.

Paul Kurtz, founder and chairman of CSI, presented the award to Randi, noting that it is granted only to "outstanding contributors to rational inquiry and scientific thinking." He noted that Randi was one of the original founders of CSI and is "a leading critic of people who engage in chicanery and fraud." He praised Randi for his application of reason to concrete cases. "Your greatest quality is that you are an educator, a teacher. You have shown that the easiest people to deceive are PhDs, a great insight to all of us. You expose myths and hoaxes. . . . You stand out in history."

* * *

Lawrence M. Krauss received the Center for Inquiry's **Scholarship in the Public Interest Award** "in recognition of his outstanding contributions in defense of scientific inquiry and on behalf of improving the public's understanding and appreciation of science."

Krauss, a leading theoretical physicist at the interface of particle physics and cosmology and also an author of popular science books (*The Physics of Star Trek*, *Fear of Physics*, *Hiding in the Mirror*) recently moved from Case Western Reserve University to Arizona State University. There he is Foundation Professor in the School of Earth and Space Exploration, director of the Origins Initiative, and co-director of the Cosmology Initiative. Krauss is one of science's most effective spokesmen. In his frequent public appearances and articles and op-ed columns in major newspapers and magazines he defends good science and warns against the politicization of science. He has been a strong and effective opponent of creationist efforts to dilute the teaching of science.

Photo: Brian Engler

Lawrence Krauss received CFI's Scholarship in the Public Interest Award.

Ronald Lindsay, CEO and president of the Center for Inquiry, presented the award to Krauss. "No one can match Lawrence Krauss's tireless efforts on behalf of the public understanding of science," he said. "He is one of the few prominent scientists to successfully bridge the chasm between science and popular culture."

* * *

Paul Kurtz, founder and chairman of the Center for Inquiry and of its affiliate organizations the Council for Secular Humanism and the Committee for Skeptical Inquiry, received a special lifetime achievement award from the Center for Inquiry. Named **The Eupraxsopher Award**, it was given for his extraordinary leadership in the causes of humanism and scientific skepticism, his lifetime of accomplishment, and his moral and ethical guidance. The award is named for a term Kurtz himself coined, from Greek roots for "good/well," "conduct/practice," and "scientific and philosophic wisdom." He defines eupraxsophy as "a set of convictions and practices offering a cosmic outlook and an ethical guide to life."

Kendrick Frazier, editor of the SKEPTICAL INQUIRER and a board member of both the Center for Inquiry and Committee for Skeptical Inquiry, presented the award to Kurtz. He noted that were it not for Kurtz none of the organizations represented at the congress would exist, and the worldwide movements they spawned would likely never have occurred. Frazier praised Kurtz as "truly, one of the world's extraordinary persons." He noted that Kurtz is a unique and remarkable combination of philosopher, scholar, and intellectual; author/editor of more than forty books in philosophy, humanism, and skepticism; founder of a major book publisher (Prometheus Books); creator and organizer of a network of nonprofit organizations advancing humanism and scientific skepticism; an international diplomat who attracts and welcomes diverse people from nations around the world; and an inspiring leader with extraordinary vision and courage.

"He stresses not negativism but the affirming values of humanism and skepticism. . . . He has lived life to its fullest, with exuberance and extraordinary service to others. By elucidating, living, and advancing strong missions, ethical credos, and causes greater than ourselves, he inspires us all to try somehow to do the same."

* * *

At a conference luncheon a day earlier, **Paul Kurtz** was also presented with an award from the National Capital Area Skeptics. NCAS President Scott Snell, who works at NASA's Goddard Space

Flight Center, presented Kurtz with **NCAS's Phillip J. Klass Award** "for outstanding contributions in promoting critical thinking and scientific understanding." The award honored Kurtz as "the person most responsible for the modern organized skeptical movement that coalesced in the mid-1970s," which included founding CSICOP (now CSI) and the SKEPTICAL INQUIRER.

"It was CSICOP's eminent coalition of physical and social scientists, medical doctors, magicians, historians, journalists, and others, assembled and energized by Kurtz's dynamic leadership and far-sighted vision, that ushered in the modern age of scientific skepticism," said NCAS's award statement. "Much is owed Kurtz as well for the formation of independent local skeptics groups like NCAS. Under his leadership CSICOP published a call for forming such groups and provided them with invaluable guidance and material support to connect with other skeptics in their community and to organize."

Photo: Brian Engler

SI editor Kendrick Frazier presented Paul Kurtz with The Eupraxsopher Award.

CFI World Congress: More Highlights

Longtime CSI fellow and SKEPTICAL INQUIRER contributor Elizabeth Loftus presented a talk about her pioneering, decades-long research into memory. Claims of paranormal events and experiences often come down to memories and recollections, in which the credibility of the claim rests on how accurate a person's memories are. Other times the result of faulty memory is more serious than a mere belief in the paranormal—including many innocent people having been convicted and imprisoned based on eyewitness testimony. Loftus drew from recent examples (such as then-presidential candidate Hillary Clinton's false memory of visiting Bosnia under sniper fire and a clip of her recent appearance on the newsmagazine *60 Minutes* about a miscarriage of justice) to demonstrate once again just how fallible our recollections can be—and the danger in assuming they are accurate.

CSI senior research fellow Joe Nickell explained the important distinction between investigating and debunking. While investigation often leads to debunking, he said, a good investigator must follow the evidence to the most reasonable conclusion rather than begin with an assumption about the nature of the mystery. With humor and wit, he recounted anecdotes from many of his cases, including that of Toronto's "haunted" McKenzie house, one of his first investigations. Joe solved the mystery by tracing unexplained, ghostly noises to a stairway in the building next door. He interviewed an employee there who was well aware of the ghost claims but never brought it up; it seems Joe was the first person to ask about it!

Introduced by Joe Nickell, James "The Amazing" Randi put his skills as a magician to work immediately. He approached the stage, adjusted the podium microphone, and began his talk. He soon wandered away from the podium with no loss in volume, surprising the audience. Randi revealed that the microphone he had been speaking into for several minutes wasn't even on; he had guided the audience's assumptions with a mere gesture and was in fact speaking on a wireless microphone.

Randi regaled the audience with humorous anecdotes from his decades of tireless work, including a Bob Newhart-like standup routine in which Randi gave his side of a telephone conversation he had many years ago. It seems that a prestigious scientist was impressed by a psychic's ability and warned Randi that his million-dollar prize might be in jeopardy. He described the amazing psychic feat to Randi, who while on the phone promptly located one of Martin Gardner's books on magic, faxed the relevant page to the scientist, and patiently waited for a response that never came. Randi's take-home message is sage advice for everyone, lay public and skeptical inquirer like: "You too can be fooled."

Susan Jacoby, author of *The Age of American Unreason*, lamented the lack of critical thinking in America. Quoting Ralph Waldo Emerson, Jacoby noted that "The mind of this country, taught to aim at low objects, eats upon itself." She drew on many examples of the sorry state of intellectual affairs in America, from Sarah Palin to the dominance of video culture over print media to "junk thought" and rampant anti-intellectualism. Jacoby's talk was not all gloom-and-doom; she saw some encouraging signs in President Obama's promise to restore science to its rightful place in government (see p. 8 in this issue).

— *Benjamin Radford*

Quest for the Giant Eel

On a six-day trip to the Canadian province of Newfoundland and Labrador (in part for a television documentary), I encountered some very large creatures: several moose (the largest land mammal of the region), to whom I gave the right of way in return for their photos; a stuffed polar bear (towering upright almost nine feet tall), which had ambled into St. Anthony one spring; and, from a circus truck that overturned ahead of me on the Viking Trail, two camels and a sweet Asian elephant named Limba.

I did not encounter humpback whales, although I took an excursion boat out in very rough water to see great icebergs making their way south from Greenland. (I had better luck with humpbacks on an Alaska excursion [Nickell 2007a].) Neither did I catch a glimpse of another leviathan that occasionally haunts the region's coastal waters: the giant squid, known at lengths in excess of seventy-five feet and the subject of numerous hair-raising adventures (Fitzgerald 2006, 50–71). (For our book *Lake Monster Mysteries*, Benjamin Radford [2006, 5] photographed the world's best-preserved specimen at a museum in St. John's.)

What I was really searching for—having been brought to the village of

Figure 1. For the TV series *Monster Quest*, the author visited Crescent Lake, Newfoundland, where "Cressie" is reported to lurk—possibly as a giant eel.

Robert's Arm by a television crew for the History Channel's popular series, *Monster Quest* (which later aired on September 17, 2008)—was a legendary lake monster said to inhabit the cold, deep, blue waters of Crescent Lake. It has been dubbed "Cressie," and the village's welcoming signboard proclaims it "The 'Loch Ness' of Newfoundland!"

"Cressie"

Sightings of a "monster" in the lake date back to the turn of the last century when a resident known as "Grandmother Anthony" spied a giant serpentine creature while she was picking berries. From the 1940s to the present, there have been a dozen or so sightings, although without photographs to date. Most descriptions are of a dark, eel-like creature, up to twenty-five or more feet long (Bragg 1995; Radford and Nickell 2006, 89–95).

Its locomotion is typically described as "rolling" or "undulating" (Bragg 1995); indeed, "when the head was up, the back was down" (Colbourne 2008). Consequently, the contortions of the elongated creature seemingly produced "humps" (Short 2008; see figure 1).

A typical sighting occurred in 1991, when retired school teacher Fred Parsons (an engaging man whom I met in Robert's Arm) saw a creature surface while crossing the lake. It was dark brown, swimming in an undulating fashion, and, Parsons estimated, over twenty feet long (Bragg 1995; see also Radford and Nickell 2006, 92–93). Of course eyewitness testimony can be unreliable. An experiment I conducted for *Monster Quest*, using a log of known length that we towed and anchored at a mid-lake position, demonstrated that people viewing something from a distance can easily overestimate its size by forty percent or greater.[1]

Joe Nickell, PhD, is the author of numerous books, including Entities *and* Adventures in Paranormal Investigation. *His Web site is at www.joenickell.com.*

Photo taken at Buffalo Zoo by Joe Nickell

Figure 2. Giant eel or otter lookalike?

There are other reasons to be skeptical of a monster in Crescent Lake, one of which is that a single creature could neither live for centuries nor reproduce itself. A breeding herd of several individuals would be required for the species to continue propagating over time. But then where is a single floating or beached carcass? It is true that the lake is connected to the Atlantic Ocean, scarcely two miles distant, by Tommy's Arm Brook. However as Bragg (1995) concedes, no great creature has ever been seen navigating the outlet.

Giant Eel?

Because "Cressie" is often likened to a giant eel (Bragg 1995; Eberhart 2002, I:114; *Monster* 2008), someone gave it the quasi-scientific name *Cressiteras anguilloida* (Eberhart 2002, I:114). Actually, this is unlikely as a scientific name that might be bestowed—if a giant-eel specimen were verified. Eels (a group of fishes having snakelike bodies and lacking pelvic fins) are of the order *Anguilliformes*, and true eels comprise the family *Anguillidae*. The American eel, for example, is *Anguilla rostrata* (Collins 1959, 475). Related eels include the marine conger eels (*Conger oceanicus*), which attain a length of six to nine feet, and the morays of tropical reefs. The Pacific moray (*Thyrsoidea macrurus*), up to a foot longer, "is probably the largest known species" (*Colliers Encyclopedia* 1993, s.v. "Moray").

Now, while Crescent Lake does reportedly host freshwater American eels, these are normally under five feet long. Divers from the Royal Canadian Mounted Police (RCMP), who allegedly surfaced on the lake with "descriptions of giant eels as thick as a man's thigh" (Bragg 1995), probably encountered a different creature—if indeed, the incident actually happened: The RCMP could not confirm the occurrence to *Monster Quest*. Indeed, whatever Cressie is, it is clearly not a giant eel. The eyewitness descriptions of a giant creature, swimming on the surface of the water and moving in an up-and-down fashion, are completely wrong for an eel.

Eels, in fact, are bottom-dwelling creatures ("Freshwater" 2008a, 2008b; "Eel" 2008), and their locomotion, while wavelike, is actually from side-to-

side, as I confirmed by studying them at Aquarium Niagara in Niagara Falls, New York (where I am a member and once served as "Animal Trainer for a Day"). For my *Monster Quest* research, the aquarium's exhibits supervisor, Dan Arcara, graciously allowed me to study an American eel and a moray eel, gently prodding the latter from its den with a pole so I could document on videotape its sideways-oscillating swimming style.

Moreover, the sightings of Cressie invariably occur during daytime, whereas the common freshwater eel "is nocturnal in its habits, sleeping or lying in the mud during the day" ("Freshwater" 2008a).

Cressie Lookalike

There is, in fact, an actual creature that is dark-colored, swims both under water and at the surface—where its wake can make it appear much longer, and moves in an undulating (rising and falling) manner. Its scientific name is *Lontra canadensis*,[2] the northern river otter (Nickell 2007c).

In addition, multiple otters swimming in a line can give the effect of a single giant serpentine creature slithering with an up-and-down movement through water. This effect was observed as early as 1930 by a marine biologist (Gould 1934, 115–116) and has since been documented many times (e.g., Nickell 2007b). Newfoundland is shown (by the *National Audubon Society Field Guide to Mammals* [Whitaker 1996, 782–785]) to be a definite habitat for the northern river otter. (See figure 2.)

I have been accused of seeming to suggest this effect as a solution to all lake monster reports (Coleman 2007), but in fact that grossly mischaracterizes my position. In *Lake Monster Mysteries*, I acknowledged other lake-monster imitators, including fish (such as sturgeon and gar), long-necked birds, windslicks, boat wakes, and logs (which may be propelled from the lake bottom by methane gas produced by decomposition [Monk 2004]). Swimming mammals like deer and beaver have also been mistaken for lake monsters. For instance, during the filming of the *Monster Quest* program, a mysterious and seemingly lengthy creature swimming under the surface of the lake created a brief sensation but proved to be a beaver.

I apply otters as a solution to *some* mystery sightings, according to the principle of Occam's razor (that the simplest credible solution, the one making the fewest assumptions, is to be preferred). When a sighting could most credibly be explained as one or more otters, like some of the Cressie sightings, then that is necessarily the preferred hypothesis. Other sightings may be attributed to other causes. However, should Cressie surface in a more credible form, I would certainly be willing to reopen the case. □

Sightings of a "monster" in the lake date back to the turn of the last century when a resident known as "Grandmother Anthony" spied a giant serpentine creature while she was picking berries.

Acknowledgments

In addition to those mentioned in the text, I wish to thank the residents of Robert's Arm, Newfoundland, who generously hosted a reception for the *Monster Quest* crew and me, complete with a wonderful seafood dinner and ceremony naming each of us an "Honorary Newfoundlander."

I also wish to thank CMJ Productions—including producer Leo Singer, production staffer Saskia DeBoer, and the film crew, as well as CFI Libraries director Timothy Binga for their help.

Notes

1. This was conducted on Saturday, June 14, 2008. Two of the three participants—Bradley Rideout and Effie Colbourne—had reported seeing "Cressie." Brad estimated the 14.25-foot log at 18 feet, Effie at 20 (although first saying "20 to 30"), and the other participant at 20 feet.

2. Formerly *Lutra canadensis*.

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On the Moon

The moon has always attracted the attention of poets, philosophers, and scientists, all of whom have said wonderful things about it, sometimes getting the facts spectacularly wrong. Ever since Galileo aimed his telescope at our natural satellite just about four hundred years ago, we have known that it is a planetary body scarred by huge craters and even bigger lava basins, testimony of a bygone violent era in the history of the solar system. We can see what the moon looks like now, and we can even conduct detailed physical-chemical analyses of samples of rocks we obtained from its surface throughout the Apollo missions of the 1970s. But can we tell how things got started? What is the origin of the moon?

That question has vexed planetologists for a long time, and it goes to the core of the travails and delights of doing historical science, of figuring out the likely paths of events that nobody witnessed and whose traces become fainter and fainter as time goes by. Astronomers have considered several hypotheses to explain the rather peculiar characteristics of the Earth-Moon system, including capture, co-formation, fission, and giant impact.

The capture theory maintains that the Moon formed in a different region of the solar system, wandered around, and came under the influence of Earth's gravitational field, becoming its satellite. The co-formation hypothesis says that the two planets accreted from the same material early during the history of the solar system. The fission scenario instead conjures up more violent images of the Moon separating from Earth due to centrifugal forces and leaving a gaping hole behind, which eventually became the Pacific Ocean. An even more catastrophic possibility is at the core of the giant impact theory, based on the idea that a Mars-sized object (named Theia, after a Greek mythological titaness) struck our planet and blasted enough material into space to subsequently form the Moon.

How can scientists tell the difference among these scenarios? In particular, why do they think that the Theia-driven impact hypothesis is by far more likely than the others to be correct? That brings us to the difficult issue of comparative historical testing, which offers a chance of learning how non-experimental sciences make progress. Nobody, of course, can prove that things happened one way or another. Then again, the very concept of proof simply does not apply to the natural sciences and should be confined to mathematics and logic instead.

Nonetheless, the balance of the evidence favors the giant impact scenario simply because it does a much better job of explaining most (though not all) of the facts. For instance, the capture hypothesis requires the early Earth to have had a much extended atmosphere to make the capture possible. Geochemical evidence tells us that this is very unlikely to have occurred. The co-formation theory runs into trouble because it clashes with the observation that the Moon is depleted of metallic iron when compared to Earth, and there is no known geological reason why that should be the case if the two planets formed from the same primordial stuff. As for the fission scenario, it should

There is nothing like new facts to add some excitement to supposedly established theories.

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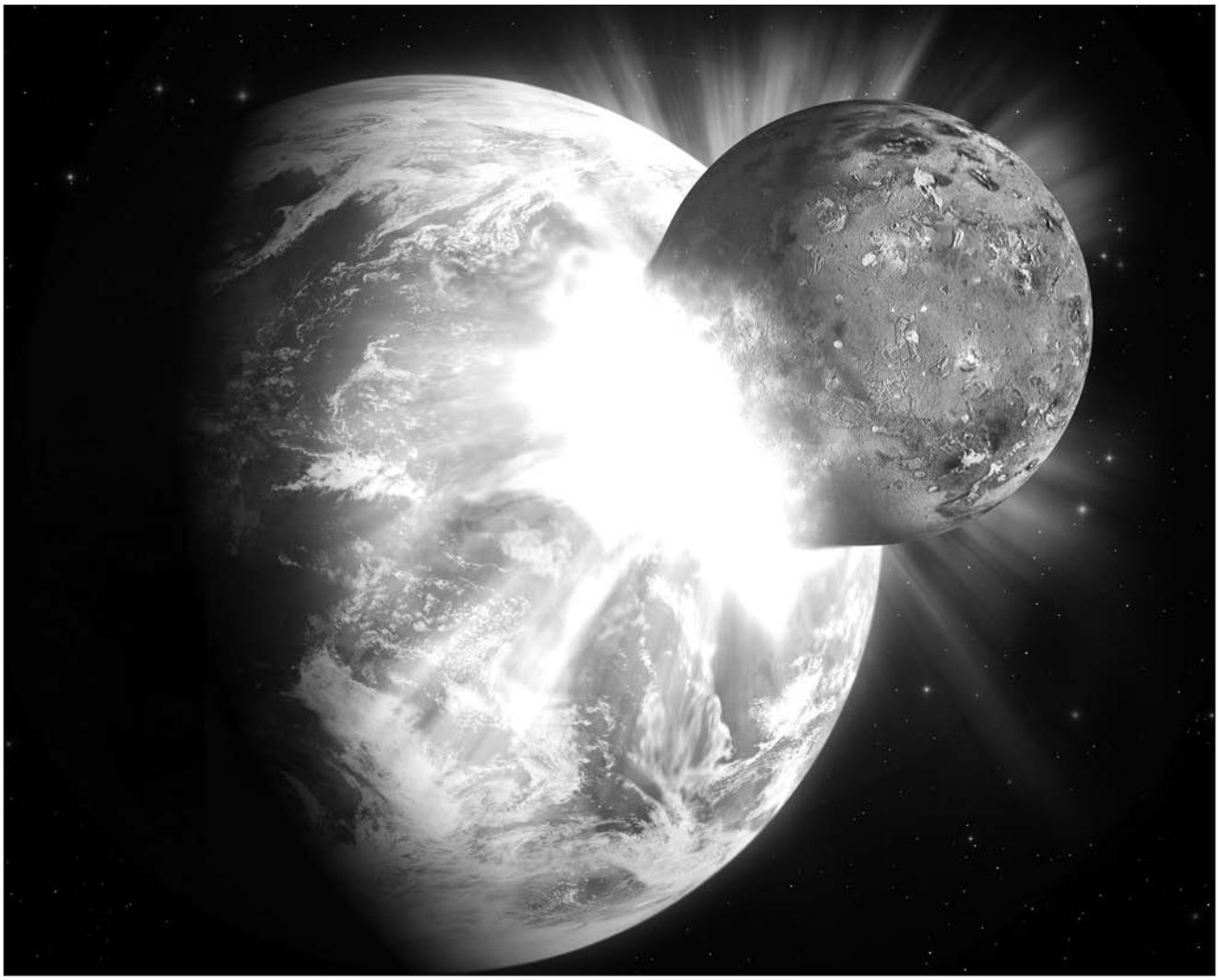

have resulted in the Moon following an equatorial orbit with respect to Earth, which is not the case, and would also require a much larger initial spin of our planet than astronomers think probable.

The reason the Theia impact possibility is favored, however, is not just because there are problems with the other theories but because of positive evidence in its favor. For example, computer simulations of that past event predict both a small lunar core and a particular momentum of the biplanetary system. Both predictions are borne out by the available evidence (though the one about momentum is directly observational, we know about the size of the lunar core only by inference based on a combination of indirect observations and further assumptions).

Case settled, then? Not so fast. Although the giant impact hypothesis is still by far the consensus in the astronomical community, there is nothing like new facts to add some excitement to supposedly established theories. During the summer of 2008, for instance, a group of researchers announced the results of a new analysis of Apollo lunar samples conducted with highly sensitive instrumentation that was not previously available. One of the surprises the group found from the samples was the presence of water inside beads of volcanic glasses. This is unexpected because it is an indication of relatively abundant quantities of water inside the Moon as recently as three billion years ago. The problem is that such water should have evaporated during the Theia impact, which is dated to 4.5 billion years ago. How did water manage to hang around for that long (or form de novo)?

The water discovery is by no means a fatal blow to the impact theory of the Moon's formation, nor is it really of much comfort to the rival hypotheses, which still have to contend with the problems sketched above. Nonetheless, a theory that previously fit the available evidence very well suddenly finds itself slipping on a wet surface, so to speak. Perhaps a better understanding of the dynamics of water on our satellite will come from the new lunar missions currently scheduled by NASA. The new data might allow planetologists to rescue the impact theory while still making sense of the recent findings. Or perhaps we need a new hypothesis altogether, something people have not thought of just yet. And so it goes with historical scientific research, which makes its progress through twists and turns. □

Eusapia Palladino, Queen of the Cabinet, Part 2

Eleven extraordinary séances with medium Eusapia Palladino, described in Everard Feilding's report, were held at the now-defunct Hotel Victoria in Naples, Italy. More precisely, they were held in Feilding's room on the fifth floor, usually starting at 10 PM and lasting about three hours. The experimenters (sometimes two or three plus some visiting observers) sat at the table with Eusapia, and the stenographer was at another table. The fact that all the happenings observed during the séances have been described to the stenographer and then published in detail in the Feilding Report has been cause for admiration. However, these detailed descriptions allow us to better understand the medium's techniques, already generally known but never presented in such detail. It is a fascinating opportunity to admire Eusapia Palladino's superb deceptions.

The Conditions of the Séances

Two thin black cashmere curtains, supplied by Eusapia, were hung at an angle in the room the spirit cabinet was located; a small table and various toy musical instruments were inside, purchased for the occasion. The depth from

Photo: H. Mairet

One of the eleven séances conducted by Everard Feilding, et al., in Naples in 1908.

the angle of the walls to the middle of the curtains was two feet, eight inches (eighty cm). Immediately in front of it sat Eusapia, with the back of her chair touching the curtains.

In front of her she had her custom-made rectangular table and sat at the narrow end of it with the experimenters on every other side. These were Eusapia's usual conditions, the ones she dictated to the experimenters and the ones they allowed her: even the curtains and the table were her own. The only new condition was the presence of the stenographer, to whom the experimenters continuously dictated their observations: a fantastic advantage for Eusapia, who could constantly be kept informed on the state of the controls moment by moment.

Since illumination was very important in allowing Eusapia to present the effects as needed, she went so far as to demand control of it, and the experimenters, again, satisfied her requests. They prepared an elaborate system of electric lights, which possessed varying degrees of illuminating power. This allowed an ample choice of low-power lights: from dim light (the strongest prevailing light is described as a light "in which we were able to read small print," p. 331) to almost pitch black, and it was Eusapia who dictated whether the lights were raised or lowered according to her needs.

It is important to stress the fact that Eusapia didn't usually want complete darkness but exactly the right amount of light that she needed, according to the phenomena she was going to produce or the controls to which she was subjected. If, for example, she was going to move an object, she needed enough light to allow the sitters to see the object move but not enough that they could understand how the movement was being accomplished.

Furthermore, as opposed to complete darkness, such dim-light conditions present various other advantages for a medium. The experimenters, for example, already have so much trouble trying to see what phenomena are happening that their attention is obviously distracted away from the mechanisms of control, here mainly Eusapia's hands and feet. Then, with some suggestions, it's easy to lead people to believe they are seeing things that they aren't. Finally, for a medium it is very useful to continually see the experimenters, to know where they are and what they are doing to prevent any unpleasant surprises.

As can be seen from the picture of Eusapia taken from the Report (see photo 1), she is wearing black clothing with a long, full skirt. When she is seated, the skirt covers the sides and the front of the chair, hiding both Eusapia's feet and the ends of the table legs close to her. On the back, the skirt touches the curtains, again black. In near darkness these are the perfect conditions for allowing her to use her feet to raise the table or to bring one foot inside the cabinet behind her.

As for the table, the one Eusapia used in most of her séances was custom-made: 2 feet, 10.75 inches long by 1 foot, 7.25 inches wide, weighing only 10.5 pounds. Such a light table is very easy to lift: imagine Eusapia sitting at the narrow end of it, with her legs touching the inside legs of the table (separated by only 1 foot 4.5 inches, the width of the table minus the width of the legs of the table). By slightly opening her legs she could very easily seize the table and move it about or lift it a few inches from the ground.

It is well known from the many exposures to which Eusapia was subjected that she was not the kind of medium who used trick apparatus or conjuring machines . . . typically she only relied on her hands and feet.

The Séance Phenomena

The 470 phenomena described as occurring during the eleven séances belonged to Eusapia's usual repertoire. First of all were the movements and levitations of the séance table: "partial" levitations, where the table remained tilted at an angle on two legs, and "complete" levitations, where the table was lifted on all four legs simultaneously. Levitations of this kind lasted momentarily "but occasionally for several seconds" (p. 347) and the table was lifted, at the most, about a foot off the ground.

Then there were the phenomena happening inside the cabinet: noises

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coming from it, objects moved about or taken out, appearances of indefinable objects from the curtains and movements of the same. Also, a small stool, which stood about three feet from the medium, was occasionally moved and various touches were felt by the experimenters. Note that all the phenomena occurred within hand or foot distance from the medium.

It is well known from the many exposures to which Eusapia was subjected that she was not the kind of medium who used trick apparatus or conjuring machines. At most she could use a thread or hair for some psychokinesis demonstrations, but typically she only relied on her hands and feet. This was enough to produce the phenomena attributed to her: to move or levitate a table she could use hands and/or feet and/or legs; to move a curtain or the objects in the cabinet she could use a hand, an elbow, or a foot.

Let's examine, for example, the complete levitation of the table. Eusapia's main method of accomplishing such an effect was to tilt it sideways on two legs (usually the legs on her right side) by pressing on top of it; then, she inserted her left foot under the left table leg closer to her. This position is known as the "human clamp": by pressing with her left hand on the table, she could straighten it and raise it, horizontally, at different heights. If she had her left heel on top of the experimenter sitting on her left, she could only raise her toes and, consequently, the table could only "levitate" a few inches. However, if she could control the foot of the experimenter on her left by different means (e.g., by touching his foot with her right foot or by having his foot on top of her empty boot) she could very easily hold the table much higher. Now, with this method in mind, read the following description of a complete levitation that occurred during Séance II. The conditions are as follows: Eusapia's hands are being held flat on the top of the table, partly resting on the experimenters' hands; C. (Carrington) sits on her left, F. (Feilding) on her right (p. 364):

> 10:58 p.m. The table tilts on the two right legs.
> C: The medium's left hand is held in mine over the table, her left foot being pressed on my right, and my right knee being in contact with her left knee.
> F: Her right hand was on my shoulder.
> F: The table was then completely levitated, and both C. and she afterwards pressed on C.'s side of the table, which went up in spite of their pressure.
> C: I pressed strongly.
> 11:00 p.m. Complete levitation of the table.

This poverty of means certainly posed a limit to the spectacle of the phenomena besides protecting her from the risks of deliberate fraud. In fact, whenever she was caught using a free limb, she claimed she was in a trance and excused herself by saying that she acted involuntarily; furthermore, she blamed the experimenters for not being sufficiently alert with their controls. In similar cases the experimenters were more than willing to think her behavior innocent. This would not have been possible had she decided to go into the materialization business and impersonate "John King," her "spirit guide": she couldn't claim to have involuntarily donned a fake beard.

By using only hands and feet, her chances of success depended entirely on whether the experimenters' controls allowed her to use them or not. Her main trick, an art in which she certainly was a recognized master, was the ability to free herself from the experimenters' control of her hands and feet.

It appears that the Feilding group was perfectly aware of Eusapia's ability to free a limb while giving the illusion that control was on each one of them, and it seems paradoxical that although they were aware of it, they allowed their conditions to be so lax as to make it easy for the medium to accomplish this same trick. Their conviction was that, being aware of the trick, they would have been able to detect it should she have used it (p. 357); this is a conviction that an experimenter should never have, especially in similar conditions. Every now and then, they tried to check if there had been a substitution (for example, checking by the position of the fingers if that was really the hand they thought they were holding); but this, according to the transcripts, only happened occasionally. It must be stated that in a few occasions they found that a substitution had in effect been made, but they noticed it only by chance (for example, somebody had been able to discern, in near darkness, her free hand moving about) and only after the fact, not while it was happening. They had to admit (p. 326) that "the skill with which the substitution was performed was remarkable. The tactile sensation of continuity of contact was unbroken. On neither occasion in Séance III, when the substitution was performed, was F. aware of it, though it was immediately seen by C., on whose side the hand was released; while in Séance XI, though visible to F. from the other side of the table, the release was not felt either by him or by Mrs. H., who was controlling on the side on which it happened."

Even easier was the substitution of a foot: when, as it often happened, each of the two experimenters felt a medium's foot on top of his, it could have been only one foot, pressing with the heel on the shoe of one experimenter and with the toes on the shoe of the other. Only rarely, according to the transcripts, did one of the experimenters check with a hand under the table and feel whether the medium's knees and legs were both where they were supposed to be. The medium, after freeing one foot, would then slip it out of the shoe (which remained at its place and could be mistaken for the foot) and could use it, as we shall see in the next installment, to produce wonderful and inexplicable phenomena. □

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Bigelow's Aerospace and Saucer Emporium

Perhaps you've seen news stories about Bigelow Aerospace, founded by Las Vegas real estate millionaire Robert Bigelow, who made his money with his chain of Budget Suites hotels. Following a path quite different from that of other companies involved in commercial space ventures, Bigelow Aerospace has a bold plan to launch an inflatable, orbiting space station as a destination for space tourists by 2012. The company plans to offer the well-heeled tourist the opportunity for a four-week sojourn in its orbiting space station for $15 million. But unlike some space entrepreneurs whose plans never leave earth, Bigelow Aerospace has already succeeded in orbiting two of its prototype modules on Russian rockets: Genesis I in 2006 and Genesis II in 2007. These are inflatable modules with sophisticated cameras and electronic packages to demonstrate the feasibility of this unique and untried approach. As of this writing, both modules remain in orbit and continue to send back data. In 2006, Bigelow Aerospace was awarded the Innovator Award by the Arthur C. Clarke Foundation.

But there is one space-related issue troubling Mr. Bigelow, one on which he feels the need to obtain, even at potentially great cost, the best counsel available: UFOs. It is not clear whether he fears that UFOs will interfere with his future orbiting hotel chain or if he believes that UFOs harbor some secrets of propulsion or anti-gravity that his engineers might someday be able to put to good use. Whichever it is, Bigelow has contracted MUFON, the largest UFO group in the U.S., with potentially very large sums of money for the pursuit of first-hand UFO information. Indeed, longtime UFO activist Ed Komarek is suggesting that Bigelow's goal is nothing less than an "alien reengineering project."

Bigelow has a long history in the matter of UFOs and "paranormal" subjects. He was the principal sponsor of the Las Vegas-based National Institute for Discovery Sciences (NIDS) from its founding in 1995 until it was placed on "inactive status" in 2004. The NIDS Web site is still up (www.nidsci.org) but apparently has not been updated since 2004. It reports on a number of UFO investigations, alleged cattle mutilations, and other far-out stuff. The best-known and most controversial project undertaken by NIDS was its purchase of a supposedly "haunted" ranch in Utah (reported in this column back in May/June 1998), which some describe as a "Hyperdimensional Portal Area" or "Stargate." The ranch is said to be infested by an alien or paranormal shape-shifting creature known as "Skinwalker," taking its name from Native American legends similar to European legends about werewolves. NIDS researchers investigated the ranch starting in 1996. They compiled an impressive collection of what might be termed "ghost stories" but, in spite of having access to sophisticated electronic equipment, failed to obtain any actual proof that anything unexplainable was going on. For a collection of wild claims and stories about this ranch, check out www.aliendave.com/UUFOH_The-Ranch.html. Rumor has it that MUFON will now take over the investigation of this "haunted" place.

It might be most accurate to describe MUFON as "the largest remaining UFO group in the U.S." since there used to be others of at least its size. Founded in Illinois in 1969 by Walt Andrus, it was originally known as the Midwest UFO Network. Geographically, it was positioned between its better-known rivals the National Investigations Committee on Aerial Phenomena (NICAP), headquartered in Washington, D.C., and the Aerial Phenomena Research Organization (APRO) in Tucson, Arizona. However, each of these UFO groups

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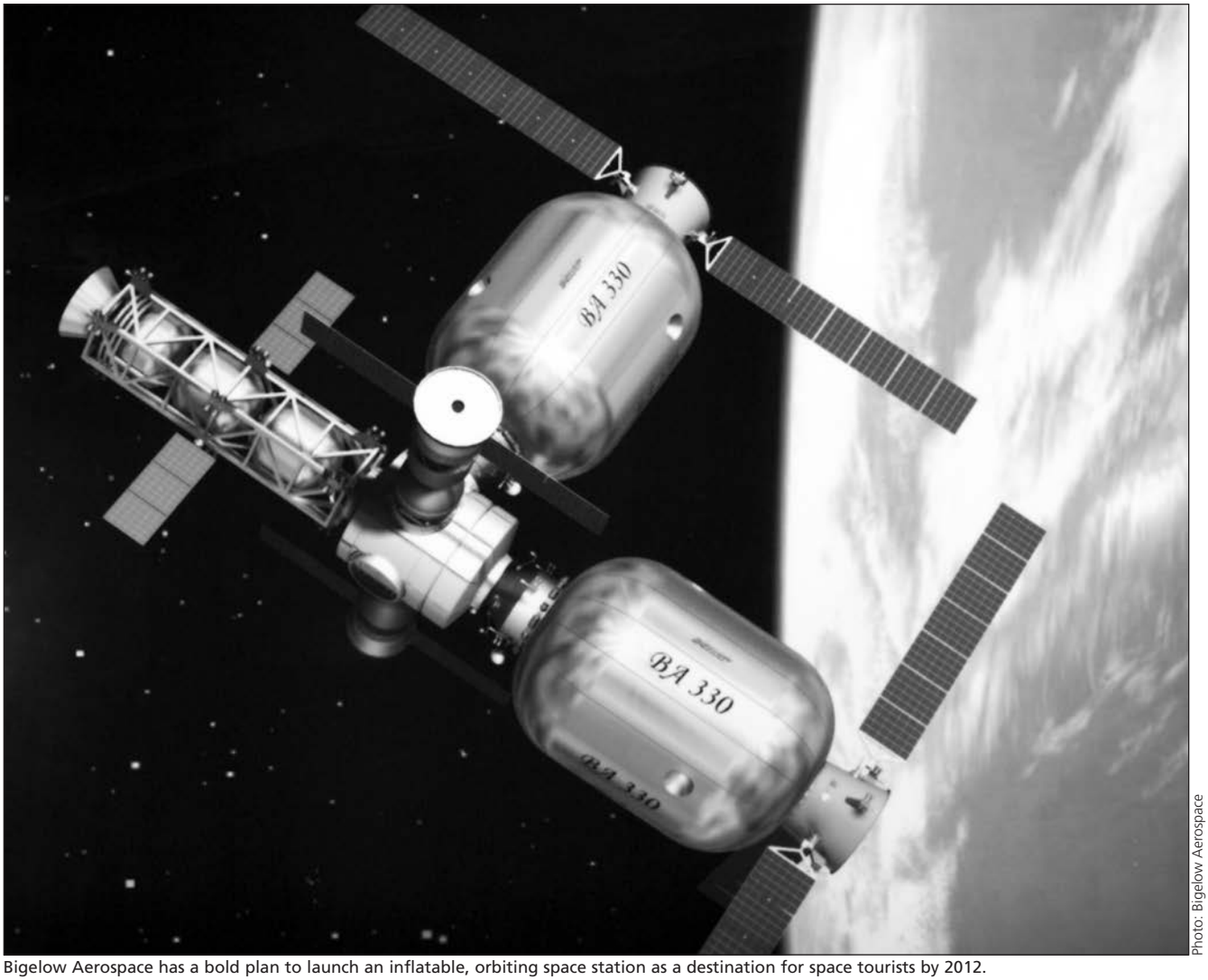

Photo: Bigelow Aerospace

Bigelow Aerospace has a bold plan to launch an inflatable, orbiting space station as a destination for space tourists by 2012.

maintained its own far-flung roster of investigators and "scientific consultants" so that any group might have a presence more or less anywhere. Andrus had originally been affiliated with APRO but got into a feud with its directors, the late Coral and Jim Lorenzen, and struck off on his own. With the demise of its rivals, MUFON found itself the last man standing. It reformulated itself as the Mutual UFO Network and picked up many of the fading groups' most active and valuable members.

Walt Andrus remained at the helm of MUFON until his retirement in 2000. I met Andrus at the National UFO Conference in Phoenix in 1984. He was an irascible man who appeared untroubled by doubts about UFOs and who was barely able to tolerate skepticism in any form. He described my 1981 skeptical book *The UFO Verdict* as "an insult to the intelligence" of the reader. During the Andrus years, MUFON publicly booted out a number of its most prominent investigators for the sin of being too skeptical about one UFO case or another that Andrus was determined to defend, most notably Ed Walters's absurdly unconvincing hoax UFO photos from Gulf Breeze, Florida. Probably Andrus found that the publicity over the Gulf Breeze photos was helping MUFON gain members, and thus criticism of the case was unwelcome within MUFON no matter how solid and factual.

John Schuessler took over MUFON until his own retirement in 2006, succeeded by the much younger James Carrion. I heard Carrion speak to Mensa last year in Denver and chatted with him afterward. Clearly more cautious than Andrus and not so hostile to skeptical questions, Carrion admitted to a great deal of uncertainty concerning UFOs and would not even make a defense of the Roswell crash claims. His position is essentially the same as that of the late J. Allen Hynek, former scientific advisor for the U.S. Air Force's Project Bluebook: he is sure that UFOs represent something unknown and significant but does not claim to know what.

Since it became a national organization (now headquartered in Colorado), MUFON has appointed state directors, subdirectors, and investigators, as well as establishing local groups that sponsor lectures and meetings. Throw a dart at a map of the U.S., and wherever it may land, MUFON will have some person whose responsibility it is to investigate a UFO report at that location. While MUFON may seem large, it is very thin. With 2,500 members spread nationwide, this means that an average-sized

state will have about fifty members, most of whom do nothing except receive the publication. In reality, 80 to 90 percent of the members of a volunteer organization typically contribute little if any useful work, which shows how thinly spread organized UFOlogy is.

It is exactly this matter of "a volunteer organization" that Bigelow is seeking to change. Bigelow's proposal is to generously fund the efforts of MUFON investigators to enable them to respond quickly to alleged UFO incidents. The agreement between Bigelow Aerospace Advanced Space Studies (BAASS) and MUFON sets up a "Star Team Impact Project" (SIP), with an initial funding period from five months to a year, with the option to renew for a second year. Investigations will be limited to cases where physical effects of a UFO are reported or where "living beings" are allegedly sighted or where "reality transformation" is said to occur. "Lights seen in the sky" do not qualify for paid investigation, a decision with which Hynek would have surely agreed. Anyone who is already a MUFON investigator can apply for a position with SIP, although new or inexperienced investigators are expected to demonstrate their skills by performing investigations of routine UFO sightings before moving up to SIP. Additionally, Bigelow is in the process of contracting up to fifty scientists, who are expected to be on the scene within twenty-four hours after significant UFO incidents, to perform state-of-the-art investigations of whatever artifacts or data the SIP investigators may obtain. All of the investigators' travel expenses will be covered, as well as a paid stipend of $100 per day of investigation. Incentive payments and bonuses are also available for those whose contributions excel. The results of SIP's first few months of investigations are scheduled to be presented at MUFON's annual convention in Denver this August.

While Bigelow and MUFON are no doubt expecting great results, perhaps even dramatic breakthroughs, from investigations of UFOs in near-real time, this "Star Team" is not, however, the first attempt within organized UFOlogy to create a "rapid response team" to quickly investigate reports. In an article in *Playboy* (December 1967), Hynek proposed (and later implemented) a national toll-free UFO Hotline to be "manned 24 hours a day by competent interrogators capable of recognizing a true UFO report from a prankster's report. . . . If the report passes preliminary and immediate screening, headquarters notifies the local police and they rush to the scene." He explained how he expected solid and irrefutable UFO data "within a year of the initiation of such a no-nonsense program." But in a moment of perhaps unguarded optimism, Hynek added, "if the UFO-1000 program is sincerely and intensively carried out for a full year and yields nothing, this, in itself, would be of great negative significance. Then we could go back to the 'real, commonsense world' of pre-UFO days—shrugging it all off with 'There must have been a virus going around.'"

In an interview in *Saga UFO Report* (August 1976), Hynek explained how his national hotline was working out: "In an unprecedented move, the FBI printed an article of mine in their monthly bulletin [February 1975]. We furnished them with a special toll-free number which they can call 24 hours a day, seven days a week. Every night we get at least one call . . . we contact one of our 300 regional representatives, and they go and interview the witnesses. Geiger counters, soil samples, physiological effects, etc., are all involved in the investigation." Hynek gave no explanation of why he had not given up on UFOs as he earlier said he would if a year-long study yielded no solid evidence.

Other "rapid response" efforts to catch UFOs have likewise been attempted. Peter Davenport's National UFO Reporting Center has been collecting UFO reports on its telephone hotline since 1974, many from law enforcement and emergency service agencies, yet UFO proof continues to elude them. In 1977 France's CNES, their equivalent of NASA, created the agency GEPAN to officially sponsor investigations of UFO reports. It, too, failed to come up with anything really convincing, and CNES terminated all UFO investigations in 2004. In the late 1990s, when according to news reports Mexico City was being inundated by a Saucer Blitz, Mexican UFOlogist and TV personality Jaime Mausson organized Los Vigilantes, who were supposed to be ready to respond to saucer reports with cameras and such at very short notice. They never obtained anything of significance, so far as I am aware. Obviously Bigelow and MUFON must expect that their "rapid response" efforts will bear more fruit than these others did, although I cannot see any reason to expect them to have any greater success than others who valiantly chased the UFO will-of-the-wisp. □

There is one space-related issue troubling Mr. Bigelow, one on which he feels the need to obtain, even at potentially great cost, the best counsel available: UFOs.

The Deadwood Ghost Photo

Q: My brother and I stayed at the historic Franklin Hotel in Deadwood, South Dakota. I'm not a big believer in the paranormal, but I'd heard about ghosts there and the room gave me the creeps. We took some pictures of our scary hotel room, including this one. At first I didn't see anything strange, but when I zoomed in on the image in the mirror, I was shocked—there appears to be a face and arms coming out of the mirror underneath my right arm. It looks like the figure has two eyes, a nose, mouth, teeth, and a hairline. What do you make of it?

—J. Oliver

Photo: J. Oliver

'Ghost photograph' taken by Jennifer Oliver at the historic (and supposedly haunted) Franklin Hotel in Deadwood, South Dakota.

A: Your experience is a very good example of how most ghost photos are discovered. My best guess is that the face you perceived is created by a pattern in something behind you and under your arm, formed by your sleeve and shirt. It may be a wallpaper pattern or piece of furniture, but more likely it is a trick of light in the window curtains. The "face" area appears to be about the same shade, tone, and color as the curtains behind you. To be honest, the face doesn't really look human or ghostly to me; it looks like a stylized carved stone or idol face, like you'd see in *Raiders of the Lost Ark* or

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on Easter Island.

I have encountered many very similar ghost faces in my investigations (see, for example, "How to Haunt a House" in the January/February 2008 SI). It is significant that you found a face in the photo; after orbs (white spots), faces are by far the most common feature in ghost photos, though some people see torsos or human-shaped figures.

People see faces in clouds, ink stains, reflections, tree trunks, even in tortillas and other food (remember the Virgin Mary "appearing" in a grilled-cheese sandwich a few years ago?). The scientific word for the psychological process is *pareidolia*, and there is even a state quarter that shows this: "The Old Man of the Mountain" in New Hampshire is a group of rocks that looks like a human face.

But why faces, specifically? People almost never report seeing a ghost's elbow, thigh, or foot! There are very good psychological reasons why we see faces in things, sometimes even when they do not actually exist. The human brain is hardwired to recognize faces; in fact, faces are the first things that babies learn to recognize, and parts of the brain are specialized for finding and recognizing faces.

In other words, it's not a matter of how you photographed a (real or ghost) face but rather that you photographed a random pattern that your brain (and most people's brains) can easily interpret as a face. Add to that, of course, the fact that in some ways you were looking for a ghost when you closely examined the photos. You had a spooky experience there and so you were unconsciously priming (or biasing) yourself to interpret things as potential ghosts. Part of it is imagination, but most of it is simply the way our brains work.

In order to fully investigate your photo, we would need to re-create it, ideally as soon after the photo was taken as possible. At this remove, even if you went back to the exact same spot, conditions may have changed; the elements that made up the face may have moved or been replaced. Even under the best of circumstances, a valid re-creation can be very difficult. Unless you took the second photograph at exactly the same height, angle to the room, etc., the flash may not play off the mirror in exactly the same way. In investigations, valid re-creations can be as elusive as the ghosts themselves. □

People see faces in clouds, ink stains, reflections, tree trunks, even in tortillas and other food (remember the Virgin Mary "appearing" in a grilled-cheese sandwich a few years ago?).

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Pathology or Paradigm Shift?

Human Evolution, Ad Hominem *Science*, *and the Anomalous Hobbits of Flores*

A pint-sized Hobbit recently shook the science world's foundations and set anthropologists at one another's throats. Was she just a diseased modern human or a different kind of human altogether? Either way, science will never be the same.

KENNETH W. KRAUSE

> *Every once in a while, there comes to light a fossil that shakes the foundation of paleoanthropology to its very core and forces us to reconsider what we thought we knew about human evolution.*
>
> —Donald C. Johanson, *Lucy's Legacy*

Wonderful and sometimes dangerous things can come in very small packages. The discovery in September 2003 of an extremely petite, human-like creature was certainly wonderful. But what could be so dangerous about a long-dead hominin little more than a meter tall with a brain the size of a newborn baby's? The answer reveals a deep and still widening rift in the scientific community between one faction standing guard over received wisdom and another bloc poised to make scientific history.

Dubbed *Homo floresiensis* by their co-discoverers, these "Hobbits" evidently thrived for thousands of years beneath the capacious limestone dome of the Liang Bua (LB) cave on the East Indonesian island of Flores. In sediments approximately 18,000 years old, archaeologists unearthed a nearly complete skeleton, including the skull. LB1, as she is known, was an adult female—about thirty years old judging from tooth-wear, but her cranium was considerably smaller than that of any other known hominin from the genus *Homo*. While modern human brains average 1,350 cubic centimeters (cc) in volume and *H. erectus* brains averaged 900 cc, LB1's amounted to just 417 cc.

Yet there were signs that these small-brained Hobbits were no dummies. Along with the skull and bones, stone tools and charred animal remains were recovered, suggesting that the LB hominins had maintained an advanced hunting culture. Until that point, most experts had insisted that such a culture was inconsistent with tiny brains and, perhaps, with any species of hominin except *H. sapiens*. As news of the Hobbits spread, challengers proposed a number of intriguing theories to explain why these creatures should not be classified as a new species. Their opponents, however, joined by LB1's co-discoverers, have not relented. The debate over *H. floresiensis* has in fact intensified since 2003, becoming ever more contentious and, at times, downright bitter.

The Early *Nature* Papers: Building a Case for *Homo floresiensis*

Homo floresiensis *challenges us because she is so unexpected, because she does not fit with many preconceptions about how humans evolved and behaved, and what they should look like.*
—Michael Morwood, *The Discovery of the Hobbit*

In October 2004, LB1 was introduced to the world in a pair of articles in *Nature* headlined by two Australians, paleoanthropologist Peter Brown and archaeologist Michael J. Morwood. From the beginning, Brown emphasized the specimen's "unique mosaic of primitive and derived traits" (Brown 2004). LB1's diminutive body size generally suggested some association with Pliocene australopithecines, Brown judged, yet her facial and dental traits tended to link her more closely to larger *Homo* specimens from the Pleistocene.

To account for the Flores hominin's small stature, Brown invoked the "island rule," or the selective advantage of insular dwarfing in the context of isolated, predator-free environments marked by reduced competition and resources. Smaller species would be favored in such situations due simply to their reduced energy requirements. *H. floresiensis*, Brown concluded, resulted from dwarfing either on Flores itself or in another insular southeast Asian environment prior to emigration.

From the outset, both teams considered the possibility that LB1 was a unique, perhaps diseased, individual. Morwood promptly rejected that hypothesis, however. Referring to a mandibular left third premolar (from LB2) found in significantly older deposits, he argued that they were "not dealing with an abnormal individual but a long-standing population" (Morwood 2004). Morwood's team also identified many of the charred faunal remains, some of which belonged to Komodo Dragons and a dwarfed species of *Stegadon*—a now-extinct group of animals related to mammoths, mastodons, and elephants. In the same location, they found "big game" stone artifacts including "points, perforators, blades, and microblades" that the team inferred "were probably hafted as barbs" by the Hobbits. Because of these artifacts' close proximity to other tools likely crafted by *H. erectus*, and because of LB1's morphological consistencies with *H. erectus*, Morwood initially judged *H. floresiensis* to have descended from that species.

More Hobbit remains were excavated from the LB cave in 2004, including the right humerus and right ulna of LB1, a second adult mandible, and various postcranial features from other individuals. In a third paper published in October of the following year, Brown and Morwood announced the discovery of at least seven more inhabitants (LB3–LB9) that had been recovered from sediments dating between 95,000 or 74,000 to around 12,000 years ago (Morwood 2005). All were diminutive—probably even smaller than LB1. On the one hand, this new evidence solidified the team's rejection of the pathology hypothesis; on the other, it compelled them to reconsider *H. erectus* as the Hobbits' likely ancestor.

Initially, Morwood and Brown noted that the second, chinless mandible (LB6)—though having smaller teeth than those belonging to LB1—was quite similar to LB1's mandible in general size, morphology (form and structure), and symphysis (where two halves of the mandible unite). Importantly, LB6 was also estimated to be about 3,000 years younger than LB1, thus providing "another line of evidence," the authors argued, "that LB1 was not aberrant, but is instead representative of a long-term, morphologically unique, small bodied population."

The team also determined that the LB1 and LB6 mandibles were more like early east African or Georgian *H. erectus* than either Javan or Chinese *H. erectus*, and that their dental symphyses most resembled even earlier hominins, including *Australopithicus afarensis*.

Morwood and Brown then examined the new arm and leg bones, first comparing Hobbit midshaft circumferences to those of modern African Pygmies. The width of LB8's tibia, for example, rested within the *Pan* (chimpanzee/bonobo) and *Pongo* (orangutan) range but not within the *Homo* range. Similarly, LB1's humerus and ulna were significantly thicker than those of the Pygmies.

Second, they compared the Hobbits' relative limb and body proportions to those of various apes and early hominins. With a relatively long arm-to-leg ratio and an antero-laterally flared pelvis, the team found that LB1's humerofemoral index was outside the range of variation for *H. sapiens* but identical to *A. afarensis* and that her body proportions were different from all hominins—including *H. erectus*—except *A. afarensis*. "Abnormal

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growth seems an unlikely explanation," the team concluded, "as growth-hormone-related dwarfism and microcephaly [literally, small brain] in modern humans result in normal limb and pelvic proportions." Although adamant that the LB hominins were not *H. erectus* or *H. sapiens*, Morwood and Brown left open the question of whether they had descended from an even earlier species of *Homo* or from an australopithecine.

The Early Detractors: Microcephaly Reconsidered

The twist is that there was a rush to judgment, because the temptation to be recognized as discoverers of a new human species was too great to resist.—Maciej Henneberg, *The Hobbit Trap*

Shortly after the announcement of *H. floresiensis*, Polish-born biological anthropologist Marciej Henneberg and Australian paleoanthropologist Alan Thorne published their criticisms of Brown and Morwood's conclusions in a non-peer-reviewed context, briefly proposing a "simple explanation" for the Hobbits' odd features (Henneberg and Thorne 2004). Secondary microcephaly (secondary, meaning occurring later in development), they argued, could explain LB1's paradoxically small braincase (five to six standard deviations below the modern average) relative to her "normal" face, nose, and jaw (three standard deviations below average). Comparing two microcephalic skulls described in the archaeological records to the skull of LB1, the authors found that not one of the fifteen dimensions evaluated differed by more than 2.5 standard deviations. Henneberg and Thorne also described LB1's orthodontic crowding and rotation problems and her receding chin as consistent with the suggested growth disorder.

In their response, Brown and Morwood acidly described Henneberg and Thorne's paper as "an extremely poorly informed, and ill designed, piece of 'research' [that] could not have been published in a substantial peer reviewed journal" (Brown and Morwood 2004). Henneberg later calculated the likelihood that LB1's cranial capacity could evolve according to standard gradualist theory and consistent with the documented hominin fossil record. He came up with a probability of "much less than 0.0001" (Henneberg 2007). Morwood crustily dismissed that claim too. Given the wealth of evidence in favor *H. floresiensis*, he said, "the probability of Henneberg's claims having any substance . . . is much less than 0.0001."

The first highly detailed dissenting analysis, however, was led by Teuku Jacob, Indonesia's then-premier paleoanthropologist, sadly now deceased, who questioned why supporters of the *H. floresiensis* taxon had compared LB1 mostly with humans from other parts of the world. Jacob offered and tested an alternative hypothesis—that "LB1 was an Australomelanesian *H. sapiens* who manifested microcephaly, which is commonly accompanied by other developmental abnormalities" (Jacob 2006).

Discussing specific skeletal features first, Jacob contended that none of the ninety-four previously described cranial features of LB1 or the forty-six features of the two mandibles were outside the range for regional modern humans. Similarly, with respect to the jaws' supposedly most distinguishing feature—absence of a chin—Jacob referred to the Rampassa pygmies currently living near the Hobbits' cave, 93 percent of whom display flat or even negative chins.

Next, Jacob turned to the issue of pathology. Microcephaly, he pointed out, is a clinically heterogenous condition potentially caused by various genetic, chromosomal, and environmental problems affecting prenatal and postnatal development. It can also result in numerous physical symptoms in addition to small brain size, including craniofacial and postcranial asymmetries. Indeed, Jacob found LB1's face to be highly asymmetrical: six of seven measured areas of its right side were as much as 40 percent larger than those on the left.

Also, he discovered that LB1's long bones were not simply "robust," as Morwood and Brown had described. Rather, CT scans revealed abnormally thin cortical bone and very large marrow cavities indicative, according to Jacob, of weak muscle attachment markings and abnormal growth. In the end, Jacob's team concluded that, contrary to Brown's assessment, LB1's traits were "not primitive but instead regional . . . and not derived but strikingly disordered developmentally."

Photo: Tim Wiencis/ Splash News

A 3D cast of the only complete *Homo floresiensis* skull found on the East Indonesian island of Flores.

Two additional critiques were published later that year. First, Robert Martin, an allometry (relative growth) specialist at the Field Museum of Natural History in Chicago, refuted Morwood's initial claim that the Hobbits had descended from *H. erectus* (Martin 2006a). LB1's braincase was smaller than any other known hominin less than 3.5 million years old, he observed, and much too small to derive from *H. erectus* by normal dwarfing.

However, a pair of British paleontologists, Eleanor Weston and Adrian Lister, have recently discovered that the brains of certain extinct island hippos had shrunk to a size 30 percent smaller than would otherwise be predicted under the traditional dwarfing model (Weston and Lister 2009).

Agreeing generally with Jacob's diagnosis of microcephaly, Martin remained unbothered by the fact of multiple LB specimens (as many as sixteen, according to Morwood's latest estimate). First, there was only one skull, that of LB1. Second,

Photo: Tim Wiencis/ Splash News

A 3D cast of a skeleton of the controversial meter-tall adult hominin named *Homo floresiensis* by its discoverers and popularly called the Hobbit.

although the discovery of a second chinless mandible raised questions (if chinlessness is interpreted as a sign of microcephaly), the dating of the second mandible was itself dubious, Martin argued, because there was strong evidence—"the mingling of at least two different assemblages of stone tools" in particular—that the dated cave sediments had been disturbed. He also denied that the Hobbits had actually produced the tools associated with them.

Martin conceded an important point, however. LB1's forelimb/hindlimb ratio did resemble that of something more primitive than *H. erectus*. It was "marginally possible," therefore, that LB1's remains provided "evidence of a new species from a lineage that diverged at a very early australopithecine stage, about 3 mya [million years ago], when cranial capacity was still very small." Nevertheless, he cautioned, the existing fossil record simply did not support the hypothesis that so many more modern *Homo* traits could convergently evolve into the proposed *H. floresiensis* lineage.

Then, during a brief review of the contemporary Hobbit literature, University of California at Berkeley biologist Gary Richards emphasized a similar point (Richards 2006). Richards first proposed a genetic rather than a pathological cause of the Hobbits' morphology—a mutation in the MCPH gene family combined with a modification of the growth hormone/insulin-like growth factor I axis). But he also challenged the new species proponents to account for Brown and Morwood's novel evolutionary scenario. The Hobbits' phylogenetic link "to any taxon other than *H. sapiens*," he warned, "results in a problem wherein the similarities between *H. floresiensis* and *H. sapiens* would have to arise by parallel evolution at the same time that the new species is undergoing significant genetic drift or selection for a reduction in stature and brain size."

Rejoinder: The Brain of *H. floresiensis*

If this is the best evidence that can be produced . . . we suggest that the authors reconsider their position on the microcephalic hypothesis.—Dean Falk (2005a)

Clearly, LB1's tiny brain had seized center stage in the hotly contested Hobbit debate. Experts can't study the brains of long-dead specimens directly, of course, but they can fashion endocast molds of braincase interiors. Although LB1's cranium was far too fragile to render a common plaster cast, Brown fashioned *virtual* endocasts using CT scans, resin, and a rapid-prototyping process called stereolithography.

Florida State University's Dean Falk, a leading expert on hominid brain evolution, decided to compare LB1's virtual endocasts with molds made from the braincases of great apes, an australopithecine, an *H. erectus*, an average-sized *H. sapiens*, a pygmy, and a microcephalic *H. sapiens* (Falk 2005b). She found that although LB1 closely resembled *A. africanus* in terms of relative brain-to-body size, its brain's general shape was most similar to that of *H. erectus*. Importantly, Falk observed as well that the Flores hominin's endocast bore little likeness to that of the pygmy and least of all to the microcephalic.

Falk's most remarkable discovery, however, was that LB1

had possessed a "well-convoluted" brain that could not have simply been a scaled-down version of an *H. sapiens* or an *H. erectus* brain. Referring to the Hobbits' big-game stone technology and evident use of fire and cooking, Falk spotlighted LB1's extremely wide temporal lobes and expanded frontal polar region, the latter of which consists of Brodmann's area 10—probably involved in planning and initiative taking—in humans. In the end, Falk's team (including Brown and Morwood) settled on two potential evolutionary scenarios: *H. floresiensis* either dwarfed under the island's unusual allometric constraints or shared with *H. erectus* an unknown, small-bodied, and tiny-brained ancestor.

But, of course, Falk's claims did not go unchallenged. German neuroscientist Jochen Weber, for example, analyzed nineteen different microcephalics (with a mean brain capacity of 404 cc) and found that seven, like LB1, presented an enlarged Brodmann's area 10 (Weber 2006). Robert Martin argued that LB1's tiny brain could not possibly result from the normal, non-pathological dwarfing of *H. erectus* and that the stone tools recovered from the LB cave were of a type never to have been associated with any species other than *H. sapiens* (Martin 2006b).

Australian archaeologist Adam Brumm, however, disagreed with Martin on the second point. Brumm's group compared the LB tools to some 500 stone artifacts excavated from the Mata Menge site in the Soa Basin of central Flores (just fifty kilometers west of the LB cave) dated from 840,000 to 700,000 years ago—at least 500,000 years prior to *H. sapiens* (Brumm 2006). Both assemblages evidenced the same use of raw materials and a very similar freehand reduction technique. Both sites, in fact, produced the same types of tools of similar maximum dimensions. According to Brumm, "the stone artifacts from Mata Menge and Liang Bua represent a technology made by the same hominin lineage. Pronouncements that *H. floresiensis* lacked the brain size necessary to make stone artifacts," he concluded, "are therefore based on preconceptions rather than actual evidence."

Professor Falk eventually published two additional papers on the ever-enigmatic brain of LB1. In the first study, she compared LB1's virtual endocast to those of nine "heterogenous" microcephalics and ten normal humans (Falk 2007). She concluded that LB1's unique features should not be attributed to pathology because (1) "the frontal breadth relative to cerebellar width and lack of cerebellar protrusion" classified LB1 at "100% probability with normal *H. sapiens* rather than microcephalics" and (2) as she had already noted, LB1's brain shared too many crucial affinities with those of *H. erectus* and *A. africanus*.

In the second paper, Falk identified seven distinct features of LB1's brain that were derived and not pathological, declaring that "to date, we are unaware of descriptions in the literature of microcephalic brains . . . that manifest anything like the suite of derived cortical features seen in LB1's virtual endocast" (Falk 2009a). But perhaps even more interestingly—and refreshingly—Falk seized this opportunity to expound on what she deems a profound "shift in the big picture" of hominin brain evolution. Conventional wisdom has long demanded that the evolution of intelligence was the product

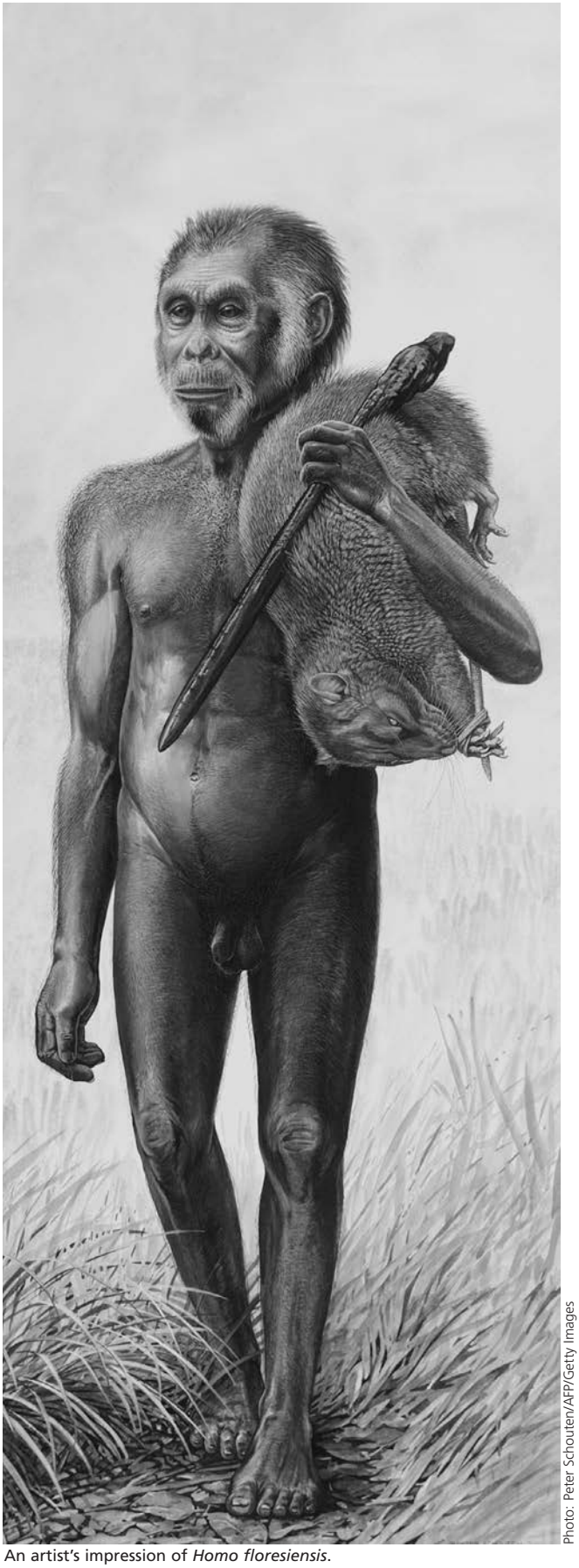


Photo: Peter Schouten/AFP/Getty Images

An artist's impression of *Homo floresiensis*.

of brain size alone. However, a Neanderthal- or *H. sapiens*-sized brain might not be necessary to the task. Hominin brain evolution—and, thus, selection for intelligence—might very well have proceeded in some species, like *H. floresiensis*, through cortical reorganization as well.

Mounting Evidence: The Body of *H. floresiensis*

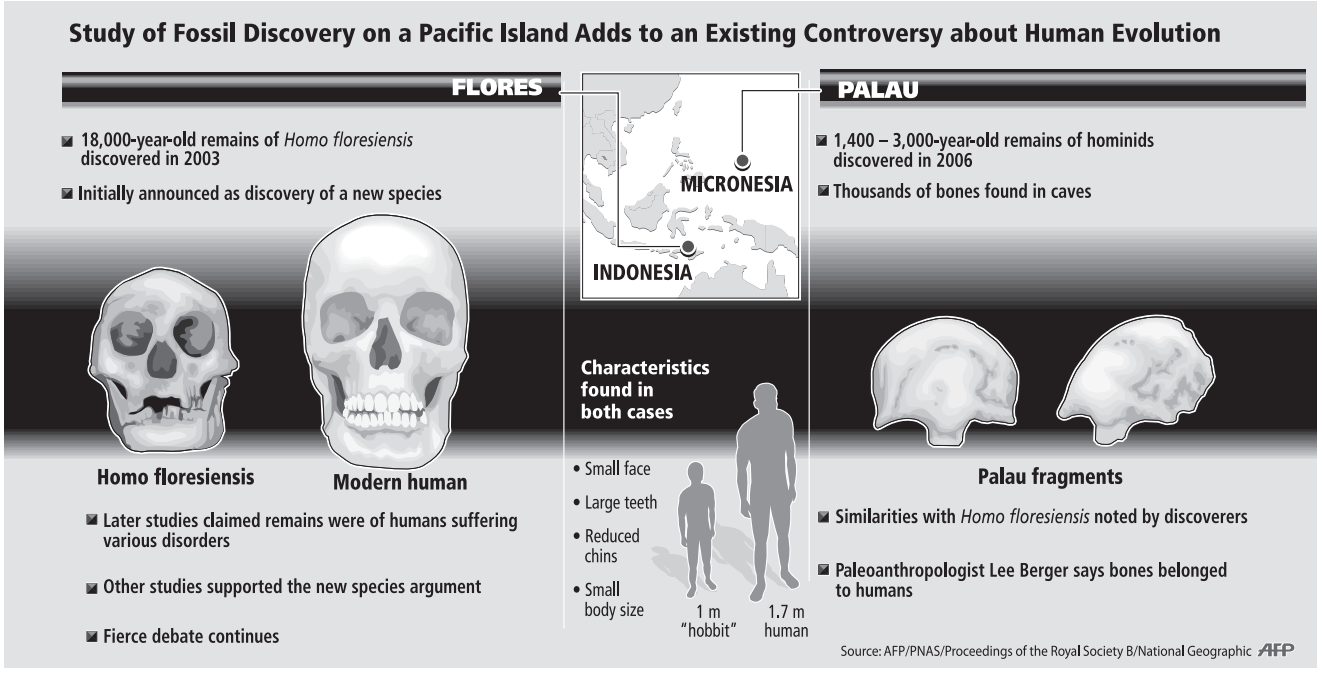
Now that much of the fuss has died down, and the validity of the new species has been established apparently to the satisfaction of most paleoanthropologists, it has become possible to discuss its affinities soberly.—Colin Groves (2007)

Three teams have published general studies of LB1's cranial morphology in recent years, and each of the three arrived at a similar conclusion. An Australian group, led by anthropologist Debbie Argue, decided that LB1's cranium did not resemble those of pygmies and was unlikely to belong to a microcephalic *H. sapiens* (Argue 2006). Instead, she proposed that LB1's skull was most similar to that of *H. ergaster*, an African species from Koobi Fora sometimes classified as *H. erectus*, and that its limb proportions most resembled those of *A. garhi*. Then, after conducting the first scaling analysis of LB1's cranium, American paleobiologist Adam Gordon found that in the absence of scaling, LB1's skull was most similar to that of non-Asian *H. erectus* and *H. ergaster* and that when modern human skulls were scaled to LB1's size, the Flores hominin's cranium proved "even more distinct" from *H. sapiens* (Gordon 2008). Finally, a second American team led by anatomist Karen Baab agreed generally that the shape of LB1's skull did not resemble that of small modern humans (Baab and McNulty 2008). They also addressed Jacob's concern regarding LB1's facial asymmetry, finding LB1's features to be "consistent with the degree of asymmetry found in extant apes and humans," and, in fact, "less asymmetrical than some other fossil *Homo* crania."

Studies dedicated to specific elements of the postcranial remains bolstered the new species hypothesis as well. For example, Susan Larson, anatomist at the Stony Brook University School of Medicine, analyzed the shoulder bones of two LB specimens and the "Nariokotome" boy (an early *H. erectus*) and compared them to the shoulders of modern humans (Larson 2007). In both the Hobbits and *H. erectus*, Larson discovered an "unexpected combination of primitive and derived characteristics" in low humeral torsion, a relatively short clavicle, and a more modern scapula.

But it was the feature of low humeral torsion (technically, "the orientation of the humeral head relative to the mediolateral axis of the distal humerus") that she found most remarkable. By contrast, high torsion characterizes modern humans. African apes display it too, as Larson explains, but it was subsequently lost at some unknown point in early hominin evolution and finally recovered by later *Homo*. In any case, for Larson, reduced torsion in both Nariokotome and the Flores hominins—distinct creatures from very different times and places—reveals a "transitional stage" in pectoral girdle evolution and strong evidence that the Hobbits were not *H. sapiens*, normal or pathological.

At about the same time, Matthew Tocheri, an expert in wrist evolution at the Smithsonian Institution's National Museum of Natural History, published his team's analysis of three of LB1's wrist bones—the trapezoid, scaphoid, and capitate (Tocheri 2007). Individually, each bone revealed an important difference between the wrists of LB1 and modern humans. Unlike the human's boot-shaped trapezoid, for example, LB1's trapezoid is more wedge-shaped, like those of other primates. Similarly, the Hobbit's capitate lacks the larger palmarly placed articular surface for the trapezoid common to both modern humans and Neanderthals and instead displays the "waisted neck" feature found in apes and australopithecines. Finally, LB1's scaphoid shows an articular surface for the trapezium that does not reach out onto the scaphoid tubercle, as in humans and Neander-


Study of Fossil Discovery on a Pacific Island Adds to an Existing Controversy about Human Evolution
FLORES
18,000-year-old remains of Homo floresiensis discovered in 2003
Initially announced as discovery of a new species
Homo floresiensis
Modern human
Later studies claimed remains were of humans suffering various disorders
Other studies supported the new species argument
Fierce debate continues
MICRONESIA
INDONESIA
Characteristics found in both cases
• Small face
• Large teeth
• Reduced chins
• Small body size
1 m "hobbit"
1.7 m human
PALAU
1,400 – 3,000-year-old remains of hominids discovered in 2006
Thousands of bones found in caves
Palau fragments
Similarities with Homo floresiensis noted by discoverers
Paleoanthropologist Lee Berger says bones belonged to humans
Source: AFP/PNAS/Proceedings of the Royal Society B/National Geographic
AFP

thals. According to Tocheri, these differences were not likely caused by developmental abnormalities like microcephaly because the shapes of these bones are determined well before the time when growth rate genes express themselves.

More generally, Tocheri discovered a significant functional distinction between LB1's hand and the hands of other modern humans. Humans, Neanderthals, and the 800,000-year-old *H. antecessor* all possessed a "complex of five bones that mesh together to ease stress on the wrist when the hand is used forcefully, for example, in pounding large tools or in precision work" (Gibbons 2007). LB1, whose hand resembles more ancient hominins like the 1.7-million-year-old *H. habilis*, lacks this bone complex.

For Tocheri, LB1's unique wrist morphology supports the hypothesis that the Hobbits descended from a hominin that migrated out of Africa prior to the evolution of the modern wrist.

Stony Brook University's William Jungers arrived at a similar conclusion in his group's new paper in May discussing the Hobbits' unusually large feet, measuring 196 mm in length (Jungers 2009b). LB1's foot-to-femur ratio was about 0.7, in fact, which "far exceeds the upper limits for modern humans," Jungers said, "and instead overlaps with bonobos." Indeed, many Hobbit tarsal bones display characteristics conforming to ape but not human samples. According to Jungers, LB1's overwhelming number and variety of primitive traits—in its feet and throughout its cranial and postcranial skeleton—proves that the Hobbits were not pathological *H. sapiens* but rather descendents of a "primitive hominin that established a presence in Asia either alongside or at a different time than *H. erectus*."

The Latest Criticisms and Responses: Pygmies, Laron Syndrome, and ME Cretins

Critics were unswayed, saying that even if one kind of pathology has been refuted, hundreds of others remain possible.—Elizabeth Culotta (2008a)

Although many detractors have never withdrawn their argument that Hobbits were simply microcephalic *H. sapiens*, previously uninvolved authors have recently joined what Henneberg once labeled the "pathology group" and proposed fascinating new explanations for the Flores hominins' peculiar physiology. For example, South African paleontologist Lee Berger questioned the new species hypothesis by comparing the LB specimens to a sample of twenty-five pygmy humans excavated in 2006 and 2007 from ten burial caves among the rock islands of Palau, Micronesia (Berger 2008). Radiocarbon dated to about 1,000 to 3,000 years old, the Palauan remains are "small," according to Berger, "even relative to other pygmy populations." Indeed, they "approximate in size *H. floresiensis* specimens and small members of the genus *Australopithecus*."

Aping Peter Brown's original characterization of LB1, Berger also noted that the Palauans displayed "some morphological features that are primitive" (dentition, jaw, and skull details) and "craniofacial traits that are considered to be uniquely derived . . . in *H. sapiens*" (a reduced chin, large teeth, small orbits, and a ridge bone at the eyebrow). That the Hobbits and Palauans shared some morphological features, Berger argues, should "caution" us that "care must be exercised in interpreting their taxonomic and phylogenetic significance." The Palauan pygmies, he adds, exemplify "the regularity with which small body size—physiological dwarfing—emerges in island contexts." Falling back on a more familiar claim, Berger attributed LB1's exceptionally small brain—which was not found among the Palauans—to "congenital abnormalities."

But Scott Fitzpatrick, an archaeologist from North Carolina State University in Raleigh, has cast "serious doubts" on what he calls Berger's "fundamentally flawed" claims and methods (Fitzpatrick 2008). He denies that Berger's sample represents a true population or, in fact, anything other than an isolated clan. Fitzpatrick's decade of work in Palau suggests, to the contrary, that early Palauans were normal sized and could not have undergone insular dwarfing—in part because Palau, unlike Flores, has never been isolated. Moreover, Australian anatomist Andrew Gallagher agreed with Fitzpatrick, concluding that the circumstances surrounding Berger's Palauan sample were "likely unconnected to the prolonged genetic isolation envisaged for Middle Pleistocene Flores" (Gallagher 2008).

Consistent with Richards' previous claim that LB1 had suffered from a defect along the GH/IGF-I axis, an Israeli team led by Israel Hershkovitz offered yet another genetic explanation for the persisting Hobbit conundrum: that "LB1 is not a new *Homo* species but a local variant of LS [Laron Syndrome]" (Hershkovitz 2007). LS, or primary growth hormone insensitivity, is a recessively inherited malady resulting from deletions or mutations within the growth hormone receptor (GH-R) gene that causes reduced growth hormone signal transmission. "The resulting phenotype," Hershkovitz observes, "is extremely low stature and small head, but normally shaped bones."

After comparing the Hobbits to at least seventy-nine LS patients and related literature, Hershkovitz isolated thirty-three shared skeletal morphologies that he deemed significant, including overall stature (106 cm for LB1 and 95–136 cm for LS patients) and skull size (5.5 standard deviations below the norm for LB1 and "up to" 5.0 SD below the norm for LS patients). With respect to brain size, Hershkovitz confessed that LS patients have smaller than normal crania, "although not to the same extent as LB1." But to account for the difference, he vaguely noted "a high degree of association between microcephaly and growth failure in general." Even so, the author felt it necessary to caution that "one should not expect complete cranial morphological similarity" because of the "numerous GH-R mutations involved in LS" and because his Mediterranean sample of LS patients would certainly differ from their South Asian and Pacific counterparts.

In closing, Hershkovitz referred (as Berger would) to Brown's famous allusion to LB1's combination of primitive and derived characteristics as the best argument in favor of distinguishing Hobbits from *H. sapiens*. But surely "nobody would argue," Hershkovitz correctly (though somewhat sarcastically) noted, that "LS patients who also manifest a similar combination . . . are direct descendents of *Homo erectus* . . . or of australopithecines."

Dean Falk and her international team of scientists, however, have very recently referred to the LS argument—and all other pathology hypotheses—as unscientific "cognitive dissonance" (Falk 2009b). Falk began her assault on Hershkovitz's paper by identifying the ten skeletal features (in addition to overall short stature) that have "traditionally" distinguished LS patients from nonaffected others. Six of those ten features were not included in the thirty-three traits listed by Hershkovitz in 2007. Moreover, Falk continued, two of Hershkovitz's thirty-three traits directly contradicted the traditional literature. Falk implied, in other words, that many of Hershkovitz's criteria were completely alien to the LS diagnostic standards.

Nevertheless, she subjected LB1 to not only the traditional criteria but to at least eleven of Hershkovitz's other criteria as well and found that "except for short stature and nondiagnostic angles of the femur, LB1 looks nothing like patients with LS." Nor was Falk impressed by Hershkovitz's cautionary caveat that "one should not expect complete cranial morphological similarity." "Despite all the variation in LS," she rebuked, "Hershkovitz et al. have [neither] described nor illuminated even one patient with LS who looks anything like LB1."

In an effort to explain the substantial number of tiny Hobbits (and their inferred intelligence), Peter Obendorf of RMIT University in Melbourne, Australia, proposed an environmental rather than a strictly genetic explanation: myxoedematous endemic (ME) cretinism (Obendorf 2008). Suffering from a lack of iodine, ME cretins are born without a functioning thyroid. The congenital hypothyroidism that results can lead to "severe dwarfism and reduced brain size," according to Obendorf, "but less severe mental retardation and motor disability than in neurological endemic cretinism."

Obendorf's team compared previously published descriptions of cretin physiology with that of LB1 and LB6 and claimed to have distinguished a substantial number of common features capable of confirming their hypothesis. Although they were "unaware of any recent ME cretinism on Flores," the Australians did offer possible scenarios in which the Hobbits may have been subjected to three environmental factors—low iodine, low selenium, and high thiocyanate—the combination of which "induces thyroid necrosis in rats, a model for ME cretinism."

Their arguments have not gone uncontested, however. In a new and quite brusque retort, Jungers (along with Falk, Tocheri, Larson, and Morwood, among others) contended that Obendorf's cretinism hypothesis "can be rejected due to numerous errors of fact and unsubstantiated speculations" (Jungers 2009). Indeed, the two teams' assessments of the facts are so disparate, one wonders whether they even considered the same data. Where Obendorf argues, "Human cretins have long arms relative to legs," Jungers counters, "The humerofemoral index of cretins is normal for humans." Where Obendorf claims, "Frontal sinuses are absent in . . . LB1," Jungers replies, "LB1 exhibits well-developed sinuses." The former says that the cretin clavicle is "consistent with that of the LB1 clavicle." But the latter argues that "the low claviculohumeral index of LB1 is outside the known range for cretins."

But there was one significant point of agreement between the two parties. The most crucial feature of pertinence is the size of each sample's pituitary fossa (a notch in the skull where the pituitary gland rests). Even so, while Obendorf claims that LB1's fossa was "enlarged . . . and a clear sign of pathology," Jungers argues that "the pituitary fossa of LB1 is damaged, but not enlarged." The scientific consensus on this point, however, seems to lean toward Jungers (Culotta 2008b). And although Obendorf believes that "numerous features" support the ME cretin hypothesis, even he refers to it as categorically "tentative."

All hypotheses positing *H. sapiens* Hobbits, diseased or not, must contend with an archaeological record that, according to Dutch researcher G.D. van den Bergh, clearly distinguishes the periods during which each hominin occupied the LB area (van den Bergh 2008). The putative *H. floresiensis* era is well evidenced by *Stegodon* remains, for example, and was immediately preceded by major volcanic activity marked by thick deposits of volcanic tuff. But "these two endemic species," van den Bergh observes, "are absent from deposits overlying white tuffaceous silts where the first skeletal and behavioral evidence for modern humans occurs" about 11,000 years ago.

Henneberg, for one, has expressed doubts about the accuracy of LB sediment dating, arguing that the deposits "could have been disturbed by flood actions." He insists that experts should radiocarbon date LB1's remains directly, a process he has repeatedly offered to fund personally. Even so, Henneberg has yet to publish a detailed criticism of the accepted chronology.

Conclusion: Persisting Issues and the Future of *H. floresiensis*

Most probably, we are on the threshold of a profound transformation of our understanding of early hominid evolution.—Robin Dennell and Wil Roebroeks (2005)

Like Johanson's famous australopithecine *Lucy*, the anomalous Hobbits of Flores may soon transform our understanding of human evolution forever—perhaps even revolutionize the very definition of humanity. But, regrettably, the debate—and, thus, the course and character of science itself—has been hideously defaced by unprofessional jealousy, rancor, and *ad hominem* attacks.

Morwood has likened detractors to flat-earthers, for example, while Robert Eckhard, a distinguished member of Jacob's team in 2006, has averred a "racist" effect to the new species model. Indeed, individuals on each side have accused their counterparts of not being "real scientists." If not their personal ethics, then their professional duties to things larger than themselves—the institutions of dispassionate scientific research and public education in particular—should suffice to prevent these kinds of embarrassing sideshows from occurring or escalating in the future.

The pathology debate, according to Jungers, is "officially over." Perhaps. But detractors continue to raise important questions. Why, for instance, has only one skull been found if the species lived on Flores for 70,000 years? Should the textbooks be rewritten based on that single cranium? Is it not peculiar that we have discovered only one tiny-brained species capable

of using tools and that it was located only on the remote island of Flores? And although it's true that tropical environments are less than conducive to molecular preservation, why should we assume that Hobbit DNA tests presenting only *H. sapiens* DNA were contaminated? No, the debates will continue, and, as anyone who both understands and respects the scientific process recognizes, they should not be discouraged.

Regardless, each of these esteemed professionals has already contributed a great deal to the resolution of some of the most exciting and momentous issues in anthropological history. Who were the Hobbits? From where and what did they come? Has nature selected for human intelligence by more than one means? At least some of the new species proponents have lately deemphasized their claims of descent from *H. erectus* and of endemic dwarfing in favor of an earlier, small-bodied and small-brained ancestor that perhaps departed from Africa long before *H. erectus*. For the first time, many believe that a more primitive but nonetheless highly intelligent species of human recently coexisted on earth with *H. sapiens* for tens of thousands of years.

The known LB specimens have been analyzed exhaustively, at least by those who continue to control their remains. DNA tests have been attempted, but thus far they have proven inconclusive. So we need to keep digging for clues on Flores and elsewhere. And that's exactly what Morwood intends to do. He'll return to the Sao Basin shortly and, of course, to the LB cave. In Timor's Atumba Basin, he has already uncovered evidence of 120,000-year-old hominins who "could be early modern humans," he says, or, on the other hand, "late representatives of the Hobbit lineage" (Morwood 2009). He hopes to excavate various Southeast Asian archipelagoes as well, the Sulawesi island's Maros region and Walanae Basin in particular.

Much work remains to be done, and hopefully most of the name-calling, side-taking, and wagon-circling will be left far behind us in favor of camaraderie, fair competition, and an irrepressible passion for the truth. If so, the best Hobbit news is yet to come, and I expect that at least some of our queries will be resolved in the very near future. But whatever the final verdict, as Jungers recently said to me, "The answer will be profound no matter what it is." □

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What's Wrong with the I Ching?

Ambiguity, Obscurity, and Synchronicity

The I Ching is an ancient Chinese oracle that many believe mysteriously offers clear advice on important questions. However, the book's wisdom is no more mysterious than randomly flipping through a book of proverbs for advice.

CHARLES SULLIVAN

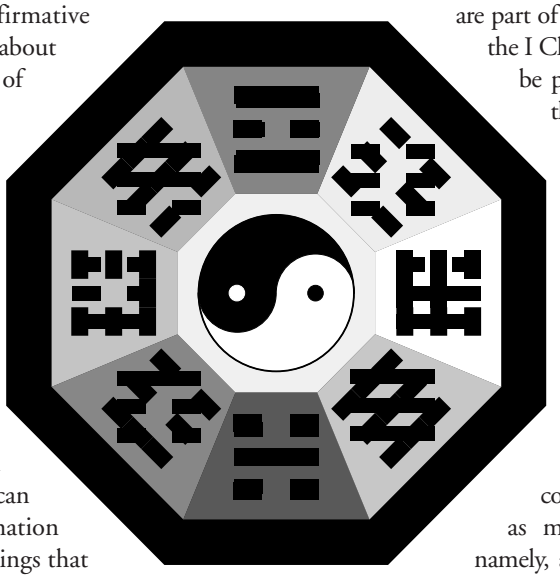
The best of seers is he who guesses well.
—Euripides

The I Ching, or *Book of Changes*, is an ancient Chinese text that combines the influences of Taoism and Confucianism and is typically used for divination purposes. The book (sometimes called "the Oracle") is said to find order in what otherwise would be chance events. The I Ching is based on Yin and Yang, the two fundamental ordering principles in Taoist philosophy and cosmology. Typically, one formulates a question for the I Ching and then tosses three coins a total of six times.[1] Depending on the configuration of heads and tails for each throw, one gets

a straight line (representing the Yang principle) or a broken line (representing the Yin principle). After six throws with the three coins one has what's called a hexagram, a collection of six straight and/or broken lines stacked on top of one another.[2] There are sixty-four possible hexagrams, and all have their own particular meaning, often with a Confucianist ethical angle to them. The hexagram one receives is believed to provide an answer to the question asked.

The Ambiguous and the Obscure

Some specific words of advice show up numerous times throughout the I Ching that appear to be no more illuminating than the advice found inside fortune cookies, although they are elaborated upon at length in the form of commentaries. Some of these words of advice include the following: "*It furthers one to undertake something*," "*Perseverance brings good fortune*," and "*Undertakings bring misfortune*." These first two bits of advice would be considered affirmative responses to one's initial question about whether to pursue a particular course of action, whereas the third seems decidedly negative.



As with other forms of divination, such as astrology or tarot cards, the answers provided by the I Ching are rather general, allowing for multiple and ambiguous interpretations. These answers are also subject to the same psychological phenomena that plague all forms of divination, namely, the Barnum Effect, where we tend to find personal meaning in statements that can apply to almost anyone, and confirmation bias, where we tend to notice those things that confirm our beliefs but ignore or downplay those things that don't.

Other advice offered by the I Ching is much harder to understand and may refer to ancient, culturally specific Chinese symbols and proverbs. Some of these include: "*A shoal of fishes. Favor comes through the court ladies*," "*Darkening of the light injures him in the left thigh. He gives aid with the strength of a horse*," and "*The companion bites his way through the wrappings. If one goes to him, how could it be a mistake?*"[3]

It seems that we could do just as well, if not better, by randomly flipping through a book of English proverbs and contemplating the advice found in such sayings as: "*The squeaky wheel gets the grease*," "*Where there's a will, there's a way*," "*Don't bite off more than you can chew*," or that most ambiguous of proverbs, "*A rolling stone gathers no moss*," whose interpretation depends upon whether the metaphor "gathering moss" is taken to be a good or a bad thing.

Obviously one can find some wisdom in proverbial sayings, and there's nothing mysterious about it. Yet many who consult the I Ching insist that something deep and mystical is at work because the utter appropriateness of the answers to the questions seems to go beyond the mere chance involved in tossing coins.

Synchronicity Time

The psychologist C.G. Jung was impressed by what he saw as the I Ching's ability to offer clear answers to important questions. Jung coined the term *synchronicity* and used this idea to explain how the I Ching works, stating, ". . . whatever is born or done in this moment of time has the quality of this moment of time" (Jung 1931, 142). The idea here is that when I concentrate on a particular question while tossing the coins in my consultation with the I Ching, my question and my coin tosses are part of that particular moment in time, and the I Ching's answer to my question will also be part of that moment in time, hence, the question and the answer are united in that moment. This somehow accounts for the coincidental appropriateness of the answer to the question. This Principle of Synchronicity is supposed to explain meaningful coincidences that, we are told, cannot be connected by cause and effect yet cannot be explained by chance either. In relation to the I Ching, Jung says, ". . . synchronicity takes the coincidence of events in space and time as meaning more than mere chance, namely, a peculiar interdependence of objective events . . . as well as the subjective (psychic) states of the observer or observers" (Jung 1950, xxiv).

Needless to say, the Principle of Synchronicity is not recognized by modern science, and the only evidence that synchronicity is behind the appearance of two coincidental events—i.e., the appropriateness of the I Ching's answer to one's question—is simply that one *happens to find* the occurrence of those events significant. The problem is that in life we're exposed to a multitude of experiences and events such that the probability is quite high that some coincidences will seem dramatic (Dean et al. 2005, 7).

Jung himself was not clear about how synchronicity is supposed to work. At one point he maintained that the outer event (e.g., the I Ching's answer) and the mental state (e.g., the question asked) are simultaneous[4] (Jung 1960, 441). Later he maintained that a mental state coincides with a "(more or less simultaneous) external event" or with a "future event that is distant in time"[5] (Jung 1960, 526). The writer Arthur Koestler, a popularizer of much of Jung's work, found Jung confusing on the matter of synchronicity, writing, "One wonders why Jung created these unnecessary complications by coining a

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term which implies simultaneity, and then explaining that it does not mean what it means"[6] (Koestler 1972, 95). As is often the hallmark of many pseudoscientific claims, Jung's synchronicity principle is a "nonrefutable or irrefutable hypothesis"[7] (McGowan 1994, 137). And despite its scientific-sounding name, the Principle of Synchronicity fares no better as an explanation than does the mysterious and undetectable "forces" used by astrologers to explain the "accuracy" found in their readings.

When Jung wrote the forward to Richard Wilhelm's 1950 translation of the I Ching, he asked the book what it thought of him introducing it to the Western mind. The hexagram he received in response was "The Cauldron" (hexagram #50).

Each hexagram within the The *Book of Changes* includes about three-to-four pages of description and commentary. This is, in part, because each individual line within the hexagram has its own particular significance and must also be explained. Jung found himself especially moved by the significance of the bottom line of the hexagram "The Cauldron," which reads, in part, "*A cauldron with legs upturned. Further removal of stagnating stuff."*

Jung interpreted this to mean that the I Ching resembles an unused cauldron, and when the stagnating stuff is removed it "may be utilized for a higher purpose" (Jung 1950, xxx). This seemed to confirm to Jung that the I Ching approved of him introducing it to Westerners. One writer critical of Jung's interpretation pointed out how a skeptic might interpret this line from the I Ching. He suggested: "The I Ching should be overthrown, and our minds cleansed of antique superstition" (Gallo 1994, 400). It would seem that one's attitude toward the I Ching may influence one's interpretation of the answer received.

Conclusion

With the I Ching, as with other forms of divination (such as astrology, tarot cards, palm reading, crystal balls, and the obscure practice of rumpology—fortune telling by examining the folds and crevices of the buttocks), the general nature of the responses allows for multiple and conflicting interpretations. Moreover, there's no known scientific mechanism (synchronicity included) by which the I Ching can divine our fortunes, give advice for the future, or explain our situations. It's important to be open minded to the possibility that such a mechanism may exist, but simply "believing" in some unknown mechanism when the I Ching's responses can be easily explained by the Barnum Effect and confirmation bias is to shut down critical thinking. Ultimately, there's no evidence that the I Ching works as a form of divination other than that its ambiguous and obscure responses can invoke the mysterious feeling that it somehow does seem to work. One may experience a comforting and mysterious feeling when believing that the I Ching is intimately connected to one's life and mind, a kind of "cosmic connection," yet such a feeling would be motivated by the desire to *believe* rather than the desire to *know*. □

Notes

1. The ancient method for consulting the I Ching involved a lengthy procedure of throwing yarrow stalks (yarrow is a plant also known as *milfoil*). The three coins replaced the yarrow stalks during the Han Dynasty (206 BCE–220 CE).

2. When throwing the three coins for the I Ching, one side of the coin (usually heads) is two, and the other side (tails) is three. Thus, each line in a hexagram can equal six, seven, eight, or nine, depending on the throw. Lines that are sixes or nines are considered changing lines, which suggests that the hexagram thrown is in the process of changing into another hexagram. In such a case, one reads the initial hexagram and the relevant lines (sixes or nines). Then the sixes and nines are said to change into their opposite: a solid line becomes a broken line, and a broken becomes a solid, creating a new hexagram. The second hexagram is typically read also, indicating further changes in store.

3. The above short bits of advice from the I Ching are taken from the Wilhelm translation.

4. Referenced in Dean et al. 2005, 7.

5. Referenced in Dean et al. 2005, 7.

6. Referenced in Dean et al. 2005, 8.

7. Originally published in Hines 1988, 1.

As with other forms of divination, such as astrology or tarot cards, the answers provided by the I Ching are rather general, allowing for multiple and ambiguous interpretations.

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Seeing the Indigo Children

The Indigo children are touted as the next evolutionary stage in human development, and their supporters boast that these children are like nothing ever seen before. But what exactly are Indigo children and just how unique are they?

BENJAMIN WITTS

Many believe Indigo children are the next step in human evolution, and they are often described as possessing a new energy never before seen on Earth. Believers claim they have special gifts, such as psychic abilities, and are "sensitive" to the world around them. They are allegedly wise beyond their years and thirst for knowledge incessantly. Their parents often see them as gifted with above-average intelligence. Above all, believers agree on one thing: they are here to teach us a lesson.

The first Indigo child was allegedly observed in the early 1970s by Nancy Tappe, who intuitively "sees" people's auras (Tappe 1999). Tappe claims that she can decipher a person's life mission by the color he or she emits. She further states

that she was aware that two new unknown colors—one of which would become Indigo—would be emerging around that time, since apparently, fuchsia and magenta disappeared from the spectrum. It wasn't until 1982, with the publication of her book *Understanding Your Life Through Color*, that the proclamation of the Indigo aura and its meaning was announced (Carroll and Tober 1999). The Indigo children movement, however, did not gain full momentum until 1999, when Lee Carroll and Jan Tober wrote the book *The Indigo Children: The New Kids Have Arrived*. Since then, the Indigo movement has been featured in books, television, a feature film titled *Indigo*, and even two videogames titled *Fahrenheit* and *Indigo Prophecy*.

What Is an Indigo Child?

The ten most common traits of Indigo children, according to Carroll and Tober, are:

> They come into the world with a feeling of royalty (and often act like it).
>
> They have a feeling of "deserving to be here," and are surprised when others don't share that.
>
> Self-worth is not a big issue. They often tell the parents "who they are."
>
> They have difficulty with absolute authority (authority without explanation or choice).
>
> They simply will not do certain things; for example, waiting in line is difficult for them.
>
> They get frustrated with systems that are ritual-oriented and don't require creative thought.
>
> They often see better ways of doing things, both at home and in school, which makes them seem like "system busters" (nonconforming to any system).
>
> They seem antisocial unless they are with their own kind. If there are no others of like consciousness around them, they often turn inward, feeling like no other human understands them. School is often extremely difficult for them socially.
>
> They will not respond to "guilt" discipline ("Wait till your father gets home and finds out what you did").
>
> They are not shy in letting you know what they need. (Carroll and Tober 1992)

The descriptors can change a bit depending on the source, but these traits are congruent with the typical account of an Indigo child. Nancy Tappe goes on to claim that at least 90 percent of children under the age of ten are, in fact, Indigo children (Tappe 1999).

Tappe (1999) lists and describes the four subtypes of Indigo children. The humanist is characterized by strong opinions, is socially outgoing, and is easily distracted. The conceptual subtype is comprised of children who are more interested in completing projects than human interaction. Tappe offers a warning that this subtype is prone to addiction, particularly in their teen years. The artist is a child who is typically smaller in size and often more sensitive. The fourth subtype is the interdimensional child, who is larger than the other three subtypes, is often seen as a bully, and can be expected to bring in new religions and philosophical beliefs.

These traits are numerous and vague. Given the breadth of individuals these descriptions cover, it would not be surprising if every child was identified as Indigo at some point in their lives, including those children who lived before the first Indigos supposedly made an appearance. Take for example the refusal to conform to social rules: there are a lot of children who do not like to wear clothes—being naked is natural. Most people can think of at least one story involving a child running around the house sans-clothing at an awkward moment. Is this child free-spirited and socially defiant? Doubtful. Most likely they are just doing what feels natural. It is too easy to turn a mundane situation like this into evidence of being Indigo:

> I remember when Johnny was only three and he would tear through the house buck naked! He was so confident with who he was. He didn't care who knew it, he was proud of himself and wasn't afraid to show his true form. That's what cued me in to Johnny being Indigo.

The subtypes of Indigo children sound rather stereotypical. There's the sensitive artist, the isolated youth who self-medicates, an upbeat, energetic child who is easily distracted, and the large unpopular child who uses his or her size to gain control over others (the artistic, conceptual, humanistic, and interdimensional subtypes, respectively). These don't sound like evolutionary advances; they sound more like one-dimensional, easily identifiable characters.

Indigo children, as mentioned above, can supposedly be identified by their auras (the "energy" that believers claim is emitted by humans and other animals). Unfortunately, not everyone (or anyone?) can see people's auras, so identification based solely on reading someone's aura can be problematic. It has also been suggested that Kirlian photography may be an effective way to identify such children. Kirlian photography is a photographic process in which a sheet of film is placed on a metal plate and the object of interest is then placed on top of the film. High voltage is sent through the plate, which creates an exposure of the object. As James Randi has shown us, Kirlian photography can be explained by the changes in pressure the subject exerts on the film or by environmental effects, such as temperature and humidity (Randi 1982). The aura identification strategy is oft debated in the Indigo community. For many believers, being labeled Indigo was merely that—the label had nothing to do with the child's aura. The only identification strategy, then, hinges on meeting the criteria based on the descriptors.

Disciplining the Indigo Child

Robert Gerard offers advice on how to properly discipline the Indigo child based on what he calls "loving discipline" (Gerard 1999). Loving discipline consists of informing the child of the purpose and course of discipline using simple explanations, avoiding reactions, orders, and verbal and physical abuse, following through with your punishment, using a time-out procedure, dealing with discipline in the moment—not delaying punishment—and discussing the situation when it is over.

Cathy Patterson (1999) gives advice on setting boundaries and guidelines to help raise an Indigo child. These guidelines include giving the child choices, using brief explanations, giving only one direction at a time, using time-outs for discipline,

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using a chart to track positive behaviors with stickers, and setting a regular and consistent routine.

In considering the disciplinary strategies advised by Patterson and Gerard, it appears that their advice is the same offered by one of the behavioral pioneers in psychology, Montrose M. Wolf. Wolf, responsible for the creation of time-out, developed these and similar recommendations in the early 1960s (Risley 2005), roughly forty years before Patterson and Gerard offered their pearls of wisdom. Is it amazing that these techniques have been around and working pre-Indigo? If the Indigo children are different from non-Indigos and require special instructions on discipline, then why are the disciplinary suggestions the same as those applied to "normal" children? These "special" recommendations on disciplining Indigo children are not unique to this population; they are universal and highly researched in the psychological community.

Indigo Children and ADHD

Doreen Virtue (1999) offers several diagnostic features of the Indigo child in addition to those listed listed above. These features include: high levels of energy, easy boredom onset, resistance to authority, learning through exploration combined with a distaste for rote memorization, the inability to sit still unless they're interested, and giving up in the face of failure, to name a few. Several of the traits describing Indigo children are comparable with a diagnosis of Attention-Deficit/Hyperactivity Disorder (ADHD), according to the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision* (DSM-IV-TR, American Psychiatric Association 2000), the handbook of diagnoses for the psychological community. Virtue asserts that Indigo children are easily misdiagnosed as having ADHD.

Kathy McCloskey, like Virtue, believes that many Indigo children are being diagnosed with ADHD (McCloskey 1999). McCloskey makes the argument for the misdiagnoses based on case studies of children who are diagnosed with ADHD and score high on IQ scales but perform average to below average in school. It sounds as if McCloskey is surprised that an ADHD child can be of above-average intelligence. As is pointed out by Schuck and Crinella (2005), it is not uncommon for children with ADHD to be of normal intelligence. Missed assignments, boredom, and forgetting to study for a test do not reflect intelligence but are reflected in a child's grade. ADHD does *not* mean a child is below average intelligence.

Leaders in the Indigo community also offer advice on what to do with Indigo children diagnosed with ADHD. This advice usually entails the cessation of any medication the child is on to treat the ADHD. Holly J. Roberts, a licensed psy-

chologist in the pediatric psychology department at the Munroe-Meyer Institute in Omaha, Nebraska, which is known for using empirically supported psychological techniques for helping children, responded to a question regarding the danger of removing medication from ADHD children:

> It is well known that psychostimulant medication is the single most efficacious treatment of ADHD as it reduces the primary symptoms of ADHD (MTA Cooperative Group 1999). That is, psychostimulant medication reduces inattention, hyperactivity, and impulsivity in children with ADHD. Therefore, discontinuing medication for a child with a definitive diagnosis [of] ADHD can have a negative impact on home and school functioning as children with ADHD typically evince a pervasive set of problems spanning behavioral, social, and academic areas.

For the Indigos who have ADHD, several alternative treatments have been offered (Carroll and Tober 1999). These treatments include supplemental vitamins and minerals, eating blue-green algae from Lake Klamath, biofeedback, neuromuscular integration, rapid eye technology, and electromagnetic field (EMF) balancing, which is purportedly a technique in which two people use each other's electromagnetic fields, which allows them to form their own reality, whatever that means.

Biofeedback is a process in which children are hooked up to an electroencephalograph (EEG) and are taught to control the brain waves that appear on a monitor by controlling their thoughts, which supposedly increases the ability to concentrate at school. Biofeedback has been considered potentially effective for treating children with ADHD (Monastra, et al. 2005), but more tightly controlled studies are required before any valid conclusions can be drawn (Loo and Barkley 2005).

It is only a small step, then, to make the same claim with neuromuscular integration—described as being very similar to biofeedback—except that this therapy is performed to "…progressively realign the entire body and recondition the nervous system" (Carroll and Tober 1999, 193) over the course of ten sessions that involve therapeutic techniques such as dialogue, journaling, and deep tissue manipulation.

Are These Children Gifted?

One claim heard from many parents of Indigos is that their child is special or gifted. Holly J. Roberts also commented on the nature of gifted children. She writes:

> There is evidence to suggest that children may achieve beyond expectations based on caregiver expectations. Outcomes of children identified as "gifted" or "early bloomers" are best demonstrated by Rosenthal and Jacobson (1968) examining teacher expectations on student achievement. The findings of this study showed that children who are randomly identified as gifted showed an increase in IQ scores at the end of the year due to the preferential treatment received by teachers based on the expectancy information. Thus, telling a child they are gifted at a young age may be beneficial but could take time and attention away from other children with similar abilities.

As indicated by Roberts's statement, caretakers' perceptions of children can easily shape their intelligence and thus how others perceive their intellectual performance ability.

What They've Come to Teach Us, and How This Will Save Us

One central theme of the Indigo movement is the idea that the Indigo children are here to teach us a lesson. Some of these lessons are outlined through stories from Indigos and parents or grandparents of Indigos in Carroll and Tober's 2001 follow-up book, *An Indigo Celebration: More Messages, Stories, and Insights from the Indigo Children*. According to several Indigo proponents, many Indigo children are "old souls," indicating that they have experienced several lifetimes and carry with them tremendous knowledge and wisdom from these past lives. Parents who believe this is true tend to keep an open mind and report their child's statements as true. For example, one child stated that the reflection of the sun's rays on the water, which were called "God spots" (p. 59), were used to take people's souls back to heaven when they die. Because the child used the phrase "back up to heaven" (p. 59), the parent unquestionably deduced that the child had knowledge regarding the existence of souls in heaven prior to a person's birth. The child of another set of parents explained that he once ruled an entire planet, but unfortunately for him there was a large disaster (an earthquake, in this case) that caused him to suffer a traumatic impact from bumping his head on a rock. This caused his spirit to fall from his body and land inside of his Earth-mother. The parents decided it was best to keep an open mind about the story.

Other stories presented in *An Indigo Celebration* (2001) include teenagers, who identify themselves as Indigo, struggling to fit in because they know they are Indigo and thus are different and isolated. A teenager reporting that he or she feels isolated, unique, and above average is not an exceptional statement—many teens feel this way. The imaginary audience and personal fable come to mind when reading these stories; both phenomena should be easily identifiable to anyone who has taken an introduction to psychology course. The imaginary audience syndrome is a common experience for teenagers—they feel that everyone is focused solely on them, and the world scrutinizes every action they make. The personal fable is related to the notion that many teens feel special and unique to the extent that the law of averages does not apply to them. This is used to explain many risk-taking behaviors by youths, even though they are aware of the potential consequences (e.g., "It won't happen to me!").

Furthermore, some say the Indigo children are here to save us from something or other. Most accounts are vague, alluding to a general change in our way of thinking and a passion for saving the earth and its inhabitants.

Making Money Off the Movement

The Indigo children phenomenon can produce big bucks for those individuals who know how to market it. In 2003, executive producer James Twyman co-wrote the movie *Indigo*. The film centers around a young girl named Grace who uses her natural, unique gift to aid her mother and grandfather in reconciling their differences while evading a mysterious person who wants to kidnap her. While the directing, acting, and plot may be sub-par, it doesn't stop those who support the Indigo

idea from declaring this film accurate and a good introduction to Indigos for the general public. *Indigo* was in limited release in January 2005 and grossed $1,190,000, according to IMDB.com. The film also received the Santa Fe Film Festival's audience award in 2003.

Along with the Indigo books that are available, there is also a metaphysically related online magazine titled *Children of the New Earth*. In this magazine, one can read about drama therapy for their Indigo child, the newest threat from fluoride, or how to raise your Indigo or Crystal child, which is yet one more unique type of child in the same vein as Indigos but beyond the scope of this article. The online magazine is currently $32.99 for a one-year subscription, but you can subscribe for a one-month trial at $4.99. The Web site also features a list of alternative schools that may be appropriate for children whose parents believe their children are Indigos.

There is a wealth of money to be made in teaching parents of Indigo children as well. For example, at metagifted.org, a company run solely by Wendy Chapman, individuals can take an online workshop related to their Indigo children through AIM or AOL instant-messaging services. The fee is $25 per person or $40 per couple. For the same prices, there are also online classes for Indigos. You can also purchase an Indigo consultation, which will provide you with information regarding your Indigo child or yourself, if you happen to be an Indigo adult. Prices are $75 per hour or $50 for a half hour by phone, $50 per hour or $30 for a half hour for an online chat, and $30 per hour if your consult is conducted via email.

Australian Scott Alexander King, a self-proclaimed animal psychic, offers seminars on Indigo children. For $250, over the course of two days (eight hours total), you can participate in "The Indigo Child and the Journey Drum," in which you will learn about the sacred art of drum making and even create your own drum. King also offers shorter seminars on learning about the Indigo phenomenon for $125.

The Future of Indigo Children

The pseudoscientific categorization of children does not stop with the Indigo children. Recently, several new categories have been proposed that offer even more options for children to be labeled as above average and gifted. These new categories include the Crystal children and the Rainbow children to name a few. These children, so named by Doreen Virtue because of the color of the aura they emit, are said to be the next generations after Indigo children. Much like the Indigos, the Crystals and Rainbows are allegedly new life energies on Earth that are here to change our global lives.

Conclusion

To date, there is no scientific way to test many of the claims endorsed by the Indigo movement. Further, the vague criteria noted to describe Indigo children could easily be applied to most people at some point in their lives. Yet despite these hurdles, many have financially benefited from the movement through the publication of magazines, books, films, therapy, and lectures.

Many parents may also benefit from the Indigo movement by labeling their child as special and gifted instead of suffering from ADHD or behavioral problems. The Indigo movement provides parents and caregivers with a happy, warm explanation for childrens' behaviors, whether good or bad. While this may not be incredibly dangerous, one begins to see the potential harm when children are removed from ADHD medications, scientifically unsupported diets are implemented, unproven treatments are utilized, and behavioral interventions are ceased for troubled children. When we divert energy and resources away from proper childhood interventions, we run the risk of inflicting long-term harm to our children.

Whether you wear rose-colored or indigo-colored glasses, your perception of the world and its workings will be affected. When we prejudge our children as gifted and insightful, that is exactly what we will get, regardless of the reality. □

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On Evolution, Abortion, and Astrology

Survey research about the kinds of people who read horoscopes shows the effects of religious and scientific beliefs. There are a few surprises.

ALAN ORENSTEIN

As a conscientious reader of this journal, I have come to the conclusion that religion is responsible for a lot of silly stuff, and if people would just come to understand and appreciate science, much of this silliness would disappear. Being a skeptic, I thought it would be appropriate to reconcile these beliefs with data from polls and surveys. Let's examine some questions.

"Human beings, as we know them today, developed from earlier species of animals. Is that true or false?"

This item comes from the 2006 General Social Survey (GSS), a national probability sample taken every two years by the National Opinion Research Center, probably the most widely used survey in the social sciences. As other con-

scientious readers probably suspect, a great many people—an amazing number, in fact—believe the above statement is false; to be precise, 50.4 percent from a sample of 1,570 answered "false," not counting the 290 who did not know and the four who refused to say.

"Do you ever read a horoscope or your personal astrology report?"

Admittedly, this is a less cleanly worded item. Are respondents being asked whether they have ever in their lives read a horoscope or whether they do so currently? And how regularly? Is it for light entertainment or for solace? Despite these lacunae, the percentage who said "yes"—57.6 percent—is unsettling. It is the relation between the two questions above that is of interest: 62.9 percent of people who believe in evolution consult their horoscopes compared to a mere 49.6 percent of people who do not believe in evolution.

"Please tell me whether or not you think it should be possible for a pregnant woman to obtain a legal abortion if the woman wants it for any reason."

The majority of abortion supporters (61.8 percent) report consulting their horoscopes, compared to 52.6 percent of people who do not support abortion. Both of these results interest me because they run counter to my expectations. Shouldn't it be the people who are unsophisticated about evolution who are also unsophisticated about astrology? And why are people who hold values I approve of with respect to abortion not equally sensible when it comes to astrology?

To suggest an answer, I divided the respondents into four groups: 1) people who believe in evolution and go to church frequently (defined as "nearly every week" or more often); 2) people who believe in evolution and go to church less frequently; 3) people who do not believe in evolution and go to church frequently; and 4) people who do not believe in evolution and go to church less frequently. Three of these groups are exactly the same in their reported use of astrology—roughly 64 percent of each group has consulted their horoscopes. In one group, only 35 percent admit to consulting horoscopes. Which group is it? It is the group in which respondents do not believe in evolution and attend church frequently. I found the same result for the abortion question: it was the combination of frequent church attendance and anti-abortion attitudes that reduced astrology use (to only 39 percent), while the other three groups were higher (63 percent, 62 percent, and 54 percent).

My interpretation of this pattern is that commitment to a church inoculates people against exploring other belief systems. By commitment, I mean both attending the church frequently and espousing its dogma. When people attend church frequently but are freethinkers who do not accept its stance on evolution or abortion, they feel free to explore astrology. When people hold anti-evolution or anti-abortion attitudes but do

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not go to church regularly, they are not being regularly inoculated against exploring other belief systems. Attitudes or church attendance are not enough by themselves to reduce horoscope use; they need to be combined to prevent the individual from straying into credulity.

One last finding: The GSS asks about the religious denomination of the churches that people attend. It divides these into fundamentalist, moderate, and liberal churches. The results given above for evolution hold for all three types of denominations when each is examined separately; the results for abortion hold for fundamentalist and moderate denominations. Frequent religious attendance appears to be more important in producing these results than the particular flavor or type of church that the individual attends.

Can science replace religious commitment, as skeptics hope? If this were so, we should find that a belief in science suppresses the exploration of alternative belief systems, just as religious commitment does.

In sum, those who are religiously committed may believe a hundred unlikely things before breakfast, but their commitment inoculates them against a thousand other impossible things. It is because only about a quarter of the American population is religiously committed that so many people are free to explore and believe in things for which there is little or no evidence.

Can science replace religious commitment, as skeptics hope? If this were so, we should find that a belief in science suppresses the exploration of alternative belief systems, just as religious commitment does. However, there is precious little evidence to suggest that this is true.

To start with education, which supposedly exposes people to science, the correlation between years of schooling and horoscope use is +0.01, or approximately zero. For example, 54 percent of those who did not graduate high school and 57 percent of those with postgraduate college degrees answered "yes" about horoscope use. Among four-year college graduates, 52.7 percent of those who took one or more college-level science course consulted their horoscopes compared to 52.8 percent of those who had not taken any science courses. Among those who did not graduate from a four-year college, 54.0 percent of those with no high school science courses and 54.6 percent of those who had taken three science courses (biology, chemistry, and physics) consulted horoscopes. Neither education in general science nor education in specialized science courses, at least as they are currently constituted, show any effect on horoscope use. To keep someone away from the paranormal, send them to church rather than school.

The GSS asked whether electrons are smaller than atoms and whether antibiotics can kill viruses as well as bacteria. On five of these general science questions, 51 percent of those who got all of the answers right consulted horoscopes compared to 56 percent of those who got four answers right and 65 percent of those who got three or fewer answers right. Here is an effect of greater scientific knowledge. However, knowledge of science is highly correlated with the results of a vocabulary test that was also administered during the survey. Statistically, holding constant vocabulary scores reduces the relationship between science knowledge and horoscope use to insignificance. Perhaps science and vocabulary scores have something in common (like alertness) that is causing the differences in horoscope use.

Some of the GSS questions measure the perceived value of science. For example, respondents were asked whether the benefits of science outweigh any harmful results; 74 percent agreed while only 7.4 percent thought the harmful effects were greater. Asked whether scientific research is necessary and should receive government support, 90 percent agreed. While these five items had no relationship to astrology use, they do indicate that the prestige of science is already so high that it is unclear how much more it can be raised.

One of the most interesting results comes from the following item: "Would you say that astrology is very scientific, sort of scientific, or not at all scientific?" Only 4.8 percent of the sample said "very scientific;" 27.4 percent said "sort of scientific;" and most people (67.8 percent) said "not at all scientific." While 73 percent of the first two groups consult their horoscopes, only 51 percent of the third group does so. Believing that astrology is scientific does increase horoscope use. However, notice that a majority of those who say that astrology is not at all scientific also consult their horoscopes. Whether something is considered scientific or not does not seem to be as meaningful to the general public as it is to skeptics.

Finally, respondents were asked if they felt they have a clear understanding of what is meant by a scientific study. Of those who thought they had little understanding, 58 percent consulted their horoscopes; of those who thought they had a clear understanding, 54 percent consulted horoscopes. However, there was a big difference between these two groups in believing that astrology is not at all scientific: 58 percent versus 80 percent.

In sum, skeptics seem to believe or hope that a decline in religious belief and a strengthening of scientific belief and knowledge will save us from astrology, UFOs, psychic surgeons, haunted houses, remote viewing, pyramid power, and other such things. In fact, were there to be a decline in religion and religious commitment, this would likely strengthen, not undermine, paranormal beliefs. In addition, we can find little evidence that astrology use is being affected by such factors as knowledge about science, exposure to general education or science courses, or the prestige accorded to science. Neither a decline in religious commitment nor greater exposure to and support for science is likely to move our society very far in the direction espoused by the skeptical community. □

Note: The raw data in this article (and the statistical tools to manipulate these data) are available at www.sda.berkeley.edu.

Careful Phrasing: A Matter of Life and Death

Many people believe one is more likely to die from a shark attack than from falling airplane parts. This finding has been widely cited in the past decade as an example of cognitive bias. A closer look at the data, however, raises suspicion that the belief is actually true and that the confusion has resulted from the wording of the research.

DANNY HELMAN

Unequivocal phrasing is a fundamental principle both in research methodology when posing questions to subjects (Fink 1995; Weisberg et al. 1996) and in the communication of ideas and results through scientific writing (APA 2001). Breaching this principle when formulating a research questionnaire could prove damaging even when respondents' understanding of the ambiguous item coincides with the researcher's meaning.

People believe a shark attack is a more likely cause of death than falling airplane parts (Plous 1993). This finding has been widely cited in the past decade as a compelling illustration of the *availability heuristic* (see, for example, Dreman 1998; Maynard 2004; Ruscio 2000; WGBH Educational

Foundation 2001). The availability heuristic (Tversky and Kahneman 1974) refers to the tendency of assessing probability by associative distance: the easier it is to think of an event or recall its instances, the more probable that event is considered. Unfortunately, employing this rule of thumb can sometimes lead to errors. It is suggested, therefore, that because shark attacks are more prominent in mass media and in basic fears, they are more easily brought to mind and consequently perceived as a more probable death eventuality, although in fact the extreme opposite is true: in the U.S., falling airplane parts are thirty times more likely to bring about your demise than a charging shark.

However, this last statistic, and with it the strength of the entire demonstration, may need to be brought into question. Notwithstanding the availability factor, some sound probability considerations lend support to the notion that airplane parts are not tens of times as life threatening as sharks. Airplanes are in general firmly held together. Parts are not shed off as a matter of procedure. And finding oneself standing in the path of a falling airplane fragment can only be the result of extreme odds and incredibly poor timing. The shark, on the other hand is a predator by nature. Encounters may be initiated (by either of the two sides), thus the parties do not need to physically collide for contact to occur. While sharks may not be as hostile or as lethal as we perceive them to be and may not include human flesh in their regular diet, attacks still occur and could potentially be motivated by fear (self-defense) or curiosity (exploration).

The actual ratio of shark attack fatalities to deaths from falling airplane parts may not be easy to verify. According to the International Shark Attack File at the University of Florida, there were eleven deaths in the U.S. resulting from shark attacks in the past fifteen years, a rate of 0.7 cases per year (Florida Museum of Natural History 2005). According to the Federal Aviation Administration, zero fatalities have occurred in the U.S. related to parts falling off airborne aircraft in the past twenty years (FAA, personal communication, April 3, 2005). These figures clearly do not coincide with the assertion that falling airplane parts claim thirty times more lives than do shark attacks.

The source cited for that assertion is a *Newsweek* piece entitled "Death Odds" (Zeman 1990), which claimed "you are more likely to be killed by falling airplane parts than by a shark" (p. 10). The odds given for the former are 1 in 10 million and for the later 1 in 300 million. It is sometimes challenging to reconstruct how magazines obtain these numbers or what they could possibly mean. (Considering the 0.7 death rate, the 1 in 300 million may stand for the annual chance of an American to be killed by a shark). As to his own source, the writer of this item could no longer be of help (Zeman 2005). The term "falling airplane parts" as a cause of death was used in that original *Newsweek* piece and was later adopted for the research on perceived probability.

A possible source for the confusion, and also the potential difficulty from a methodological point of view, lies with the use of a term that could be read in more than one way. "Falling airplane parts" is a phrase with two possible meanings: Falling *airplane parts* could be parts falling off of airplanes, or *falling airplane* parts could be parts of falling airplanes.

If falling airplanes are involved, this could be grounds for a recount, possibly resolving at least some of the discrepancy. In fact, an individual being hit by a whole falling airplane (perhaps excluding a falling part) could now qualify for this cause of death. The first writer who employed the term "falling airplane parts" in a list of possible causes of death may have been using it to succinctly name a category for different types of ground fatalities from airplane crashes. Even under this meaning, casualties from falling airplane parts in the past couple of decades are few. They may seem more numerous than they actually are due to the *availability heuristic*, as falling airplanes receive extensive media coverage. The 30 to 1 ratio statistic, however, might have been closer to the truth at the time.

Even if both the writer of the questionnaire and the respondents had the same meaning in mind (that of parts falling off airplanes), the source for the factual trivia that provides the basis for this study may have had another. Regardless of the facts in this case—the number of dead, who was referring to what, and the chain of events which brought about the coining, adoption, and citing of the phrase "falling airplane parts"—using such an ambiguous term in research leaves any finding open to future objections, arguments, and doubts. □

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Chiropractic Neck Manipulation and Informed Consent

Although there is evidence to indicate that neck manipulation can cause stroke by damaging vertebral or carotid arteries, few chiropractors acknowledge this danger. The dangers and limitations of neck manipulation should require the need for informed consent from patients.

SAMUEL HOMOLA

The public is largely unaware that upper neck manipulation, often routinely performed in chiropractors' offices, can cause stroke by injuring vertebrobasilar and carotid arteries. Such injury is not common, and the true incidence of injury is not known.

Widespread concern about neck manipulation as a cause of stroke began in 1996 when a RAND publication estimated that the incidence of stroke and other serious complications was about 1.46 per one million manipulations, adding that only about 11.1 percent of indications for neck manipulation were appropriate (Coulter 1996). In the same year, the National Chiropractic Mutual Insurance Company (NCMIC) published a manual that stated: "It has to be

accepted that VBS [vertebrobasilar stroke] following SMT [spinal manipulative therapy] does occur. The temporal relationship, between young healthy patients without osseous or vascular disease attending a SMT practitioner, then suffering these rare strokes is so well documented" (Terrett 1996).

Estimates on the incidence of stroke caused by neck manipulation range from one in 400,000 to one in 5.8 million, depending upon the biases of the group doing the survey. A chiropractor-authored review of malpractice data provided by the Canadian Chiropractic Protective Association, for example, concluded that stroke caused by neck manipulation occurred only once per 5.85 million manipulations (Haldeman 2001). This stroke-manipulation ratio is widely quoted by chiropractors despite the fact that court-litigated cases do not reflect the total number of manipulation-related strokes, most of which are unreported or undetected.

Further backing away from observations that neck manipulation is a cause of stroke, a 2006 report published by NCMIC Chiropractic Solutions concluded that "The incidence of stroke in the population as a whole is no different (2 per 100,000 persons annually) than among those who received manipulation treatment of the neck," adding that "the best scientific evidence available has shown no causative relationship between appropriately applied spinal manipulation and stroke events" (Triano 2006).

Many studies have linked chiropractic upper neck manipulation with stroke (Terrett 2001, Ernst 2007). Recent reports produced by chiropractors, however, argue that the incidence of stroke among persons who have had neck manipulation is ". . . to the same order of magnitude as that occurring in the general population" (Triano 2006) and that there is ". . . no evidence of excess risk of VBA [vertebral artery] stroke associated with chiropractic care compared with primary care" (Cassidy 2008). But these reports fail to distinguish strokes caused by trauma to the vertebral arteries of young, healthy people from the type of strokes that occur among predisposed persons, especially the elderly group. No consideration is given to the possibility that most cases of stroke caused by neck manipulation may go unreported. When patients seek medical care for paralytic symptoms caused by release of a blood clot that was formed days or weeks earlier by neck manipulation, a connection between neck manipulation and stroke may not be made. Such strokes may then be reported by primary care physicians who are unaware of preceding trauma caused by neck manipulation.

The most recent chiropractor-headed study of the association between chiropractic visits and vertebrobasilar artery stroke, based on billing records, concluded that strokes associated with chiropractic neck manipulation occur because patients with headache and neck pain caused by vertebrobasilar dissection (splitting of artery walls) seek chiropractic care for relief of symptoms: "The increased risks of VBA stroke associated with chiropractic and PCP [primary care physician]

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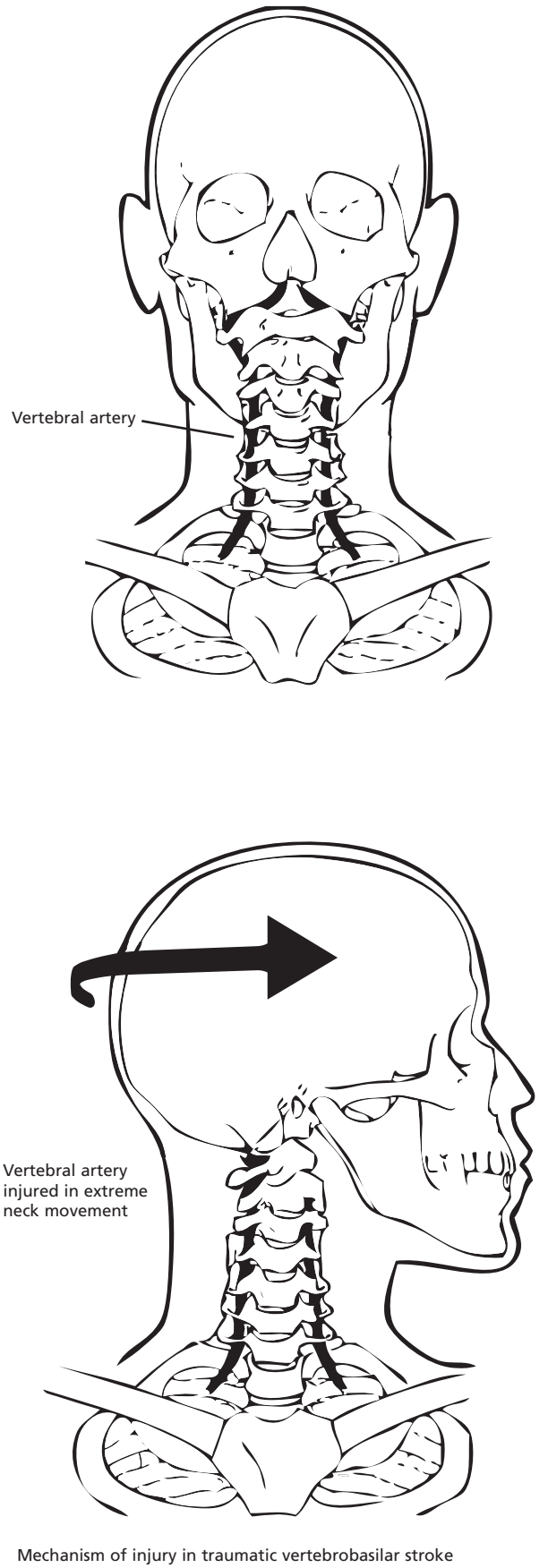
visits is likely due to patients with headache and neck pain from VBA dissection seeking care before their stroke" (Cassidy 2008). In other words, the report implies that a chiropractor is not to be blamed for making an incorrect diagnosis and then manipulating the neck of a patient who presents the symptoms of a stroke in progress. It goes without saying, however, that it is the responsibility of the chiropractor to recognize symptoms of stroke before manipulating the patient's neck. Clearly, patients with head and neck pain that might be the result of stroke or arterial dissection should not have their necks manipulated. Elderly persons who might be susceptible to stroke because of diseased vertebral arteries should not be subjected to the risk of neck manipulation. The fact that spontaneous vertebral artery dissection can occur in susceptible persons of all ages does not excuse neck manipulation as a cause of traumatic dissection but rather underscores another reason for avoiding such treatment whenever possible.

It is enough to know that strokes occurring among healthy, young people immediately following neck manipulation are likely to be the result of trauma to vertebral arteries. And it is enough to know that strokes associated with neck manipulation are often the result of unnecessary treatment. Persons undergoing neck manipulation "to maintain health," for example, have developed symptoms of stroke while still lying on the treatment table (Hall 2008). Such observations alone are enough to warrant a requirement that every patient read and sign an Informed Consent sheet before submitting to neck manipulation by any kind of practitioner.

Indications for Neck Manipulation

Manipulation of the upper cervical spine should be reserved for carefully selected musculoskeletal problems that do not respond to such simple measures as time, massage, mobilization, or longitudinal traction. Because of the tortuous route of the vertebral arteries where they thread through the transverse processes of the first and second cervical (uppermost neck) vertebrae and then make a sharp turn to enter the skull, head and neck rotation forced by manual manipulation should not exceed 45 or 50 degrees if kinking or traumatic dissection of these arteries is to be avoided (Magee 1987, Terrett 2001). Rapid manual rotation of the cervical spine might also cause damage by overcoming the arteries' normal elasticity, causing tears and blood clots in the intimal lining of the arteries. The slow stretching of mobilization within a normal range of movement may be less damaging to arteries than the rapid movement required to rotate the cervical spine beyond its normal range of motion or to move joints into the paraphysiologic space to produce popping or cavitation.

Except in rare cases where there is significant discomfort or loss of mobility caused by binding or fixation of a vertebral joint or by entrapment of a synovial membrane or a cartilaginous fragment, there is no credible evidence to indicate that neck manipulation is any more effective for relieving neck pain than a number of other physical treatment modalities. There is certainly no justification for routine use of cervical manipulation as a treatment for general health problems.



Mechanism of injury in traumatic vertebrobasilar stroke

All things considered, manual rotation of the cervical spine beyond its normal range of movement is rarely justified. The neck should *never* be manipulated to correct an asymptomatic "chiropractic subluxation" or an undetectable "vertebral subluxation complex" for the alleged purpose of restoring or maintaining health or to relieve symptoms not located in the neck. There is no evidence that such subluxations exist. When a painful orthopedic subluxation (partial dislocation) occurs, manipulation might occasionally be helpful but is most often contraindicated (Homola 2006a).

The bottom line is that while there might be an occasional need for appropriate, properly controlled neck manipulation in the treatment of an uncomplicated musculoskeletal problem that results in loss of mobility, there is no justification for the use of such treatment based on the chiropractic vertebral subluxation theory. Consultation with an orthopedist or a neurologist should be part of a consensus that determines the need for neck manipulation, weighing benefit against risk. Persons with certain structural or vascular abnormalities or who might be taking blood thinners or other medications that would increase risk of bleeding should be advised not to undergo neck manipulation for any reason.

When a sudden onset of neck pain occurs, it is absolutely essential that an attempt be made to rule out a preexisting vertebral artery dissection *before* neck manipulation is done, lest manipulation release an embolus that will travel to the brain. Sudden, severe headache might be an indication that stroke is occurring or is about to occur. Neck manipulation should not be considered until a neurologist has tested the patient for symptoms of stroke. Such a careful approach would be problematic among chiropractors who base diagnosis and treatment upon detection and correction of vertebral subluxations (Homola 2006b).

Better Safe than Sorry

Since it may be difficult or impossible to determine beforehand who might have weak or diseased vertebral arteries or who might be vulnerable to vertebral artery dissection or stroke that could be caused or aggravated by upper neck manipulation (and even more difficult to find a practitioner who uses manipulation appropriately), my advice for the average person would simply be to avoid rotational neck manipulation of any kind.

There are many chiropractors who claim to be able to improve health and relieve neck pain or headache by tapping on "subluxated" cervical vertebrae with a spring-loaded stylus, thus avoiding dangerous rotation of the neck—a safe but ineffective treatment. Some of these chiropractors believe that misalignment of the atlas, the uppermost cervical vertebra, is the cause of a variety of unrelated ailments, including low-back pain. Nearly 26 percent of chiropractors subscribe to this "Palmer upper cervical" belief (Christensen 2005). Most vertebral artery injuries occur at the level of the atlantoaxial joint (the joint between the first and second cervical vertebrae) where there is no intervertebral disc and where the greatest amount of rotation takes place.

According to the Association of Chiropractic Colleges (ACC), "Chiropractic is concerned with the preservation and restoration of health, and focuses particular attention on the subluxation. A subluxation is a complex of functional and/or structural and/or pathological articular changes that compromise neural integrity and may influence organ system function and general health" (Christensen 2005). Chiropractors who are guided by this vague paradigm often manipulate the full spine of every patient for "subluxation correction."

Making a Choice

While physical therapists, physiatrists, and orthopedists sometimes manipulate the neck for a carefully selected musculoskeletal problem, chiropractors who are guided by the ACC's subluxation paradigm may routinely manipulate the neck for "the preservation and restoration of health," thus subjecting the patient to unnecessary risk. Whatever the incidence of stroke per number of neck manipulations might be, this risk is greater *per patient* among chiropractic patients who may be manipulated many times for "health reasons" and who may be manipulated regularly for "maintenance care." Chiropractors who renounce the vertebral subluxation theory and specialize in the care of back pain will use manipulation more appropriately. Unfortunately, there is no official or legal definition limiting chiropractors to treatment of musculoskeletal problems, making it difficult to find a properly limited chiropractor (Homola 1998).

Informed consent as a requirement for neck manipulation, no matter who does it, would make most of us think twice before submitting to such treatment—except in rare and special cases in which consultation with relevant medical specialties confirms that benefit outweighs risk. □

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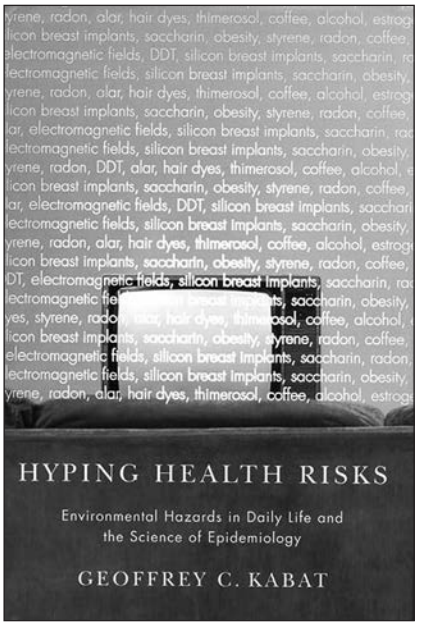
When Science Gets Distorted for Nonscientific Reasons

TERENCE HINES

Hyping Health Risks: Environmental Hazards in Daily Life and the Science of Epidemiology. By Geoffrey C. Kabat. Columbia University Press, New York, NY, 2008. ISBN 978-0-231-1418-2. 250 pp. Hardcover, $27.95.

Geoffrey C. Kabat, a senior epidemiologist at the Albert Einstein College of Medicine, argues strongly and persuasively in this excellent book that misinterpretations of epidemiological data, often by epidemiologists themselves, have resulted in a society "hyperattuned to anything that may affect our health" (p. xi). He tells four important scientific detective stories, all ending with the accused being cleared of almost all charges. The original charges were brought by epidemiological studies of, at best, dubious quality. In one case, that of possible effects of second-hand cigarette smoke, the science was badly perverted to support the preexisting expectations of the prosecutors. Findings that contradicted the politically correct view were met with attempts at outright suppression and when published, were followed by personal attacks on the authors' integrity but not on the quality of their science. This is a disturbing story of science's betrayal by the very people who are charged with using scientific results to guide rational decisions about health risks.

An introductory chapter titled "Toward a Sociology of Health Hazards in Daily Life" sets the stage for the author's discussion of how social and political influences shape the way health risks are investigated and reported. The second chapter, "Epidemiology: Its Uses, Strengths, and Limitations," is an excellent review of epidemiological methods and techniques. It clearly explains different types of studies, such as descriptive, case-control, cohort, randomized, etc., and the strengths and weaknesses of each. Tricky subjects such as statistical interactions, establishment of causality, absolute versus relative risks, pooling of studies, and meta analysis are all covered.



The next four chapters are case studies of specific health scares. The chapters cover environmental causes of breast cancer (chapter 3); power lines and cancer (chapter 4); risks of residential radon (chapter 5); and, finally, the risks of second-hand cigarette smoke (chapter 6). There is a concluding chapter followed by two appendices, extensive bibliographical notes, bibliography, and an index.

In the 1990s it was claimed that there was an epidemic of breast cancer on Long Island. Sometimes cancer does occur more often than would be expected by chance. The psychological desire to blame something obvious and identifiable for such clusters is easy to understand. It's much more satisfying to have a known villain to blame than to put the cause down to amorphous statistical deviations from chance. The result is a search of the local environment. Inevitably, such a search yields an excess of power lines, leaky old oil tanks, microwave towers, or some such, which are promptly blamed for the cluster.

The villain singled out in the Long Island breast cancer scare was unspecified environmental pollution. The belief that this was responsible led Congress to require an expensive study of environmental factors in the causality of breast cancer on Long Island that ended up costing millions of dollars but provided no new knowledge about the causes of breast cancer. This is a prime example of political and social—as opposed to scientific—factors driving which issues receive research funding. In the end, all the expensive government-funded research showed no influence by environmental

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pollutants on breast cancer rates.

In the next chapter Kabat takes up the claim that electromagnetic fields from power lines cause cancer. This health scare first popped up in the 1980s. Even though it has been entirely debunked in the scientific community, it is still alive and well in the public mind. It is far easier to whip up fears than to reduce them. Much like the Long Island breast cancer scare, the hysteria over power lines started when untrained individuals, especially parents of children with cancer, noted that cases of childhood cancer seemed to be more common in areas with a large number of power lines. This sort of "evidence" is emotionally compelling but totally invalid—a dangerous combination. The hysteria was further fed by conspiracy theorist Paul Brodeur, who wrote a series of articles in the *New Yorker* and books promoting the view that the power companies were covering up the danger of power lines. This chapter covers the history of the power line controversy quite well, with discussions of some of the hypotheses put forth to explain the relationship between power lines and cancer that, in the end, didn't exist.

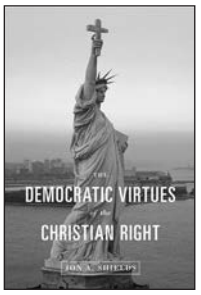
One failing of this otherwise excellent book is that Kabat doesn't emphasize one of the major reasons for the false belief in these various health scares: the multiple comparison fallacy. The basic idea is that if one makes enough comparisons one can find, just by chance, results that seem to show that, say, stamp collecting causes cancer. The classic example of this was the infamous Swedish study of the dangers of power lines. The published paper reported sixty-six different risk ratios. The only one that got much attention was one that showed a four times higher risk of cancer for those living near power lines. But this one was only one out of sixty-six reported results. It gets worse. The published paper (*American Journal of Epidemiology*, 1993, 138, pp. 467–481) was just a summary of a study in which nearly 800 risk ratios were computed. Out of that huge number, it would be very surprising if at least one result *didn't* show such an increased risk, just by chance. And, of course, among those 800 results many showed that those who lived near power lines had a reduced risk for developing cancer.

The next chapter discusses the risks of residential radon. Remember that scare from the 1980s? That health worry has happily gone the way of eight-track tapes. But as Kabat explains, the hype about the risks of radon was based on the same sorts of errors as those made in overstating the risks of environmental pollution for breast cancer and power lines for cancer. A special strength of this chapter is an important discussion of the difficulty in measuring actual exposure to residential radon, which might seem simple but certainly is not.

The final case study is by far the most controversial. Kabat argues that there is essentially no risk of getting cancer or heart disease from second-hand or passive tobacco smoke. This flies in the face of accepted wisdom. I was very surprised as I read this chapter to see that the evidence linking second-hand smoke to disease was so weak as to be basically nonexistent. So where does the hype come from? It is here that Kabat is at his best as he describes how the actual results of studies of second-hand smoke have been co-opted to push the political agenda of those wanting to ban smoking in public places. I'm totally in agreement that such smoking should be banned. It's as annoying and repulsive as someone sitting at a nearby table in a restaurant playing a loud radio. But we can quite properly ban playing loud radios in restaurants, theaters, airplanes, trains, and offices without having to resort to distorting the science to argue that "second-hand listening" causes cancer of the inner ear.

The misrepresentation of the studies of the effects of passive smoking has clearly distorted the science that aims to prove ill effects of passive smoking. At this point, I expect that someone will point out that Kabat was an author of a large study funded by the tobacco industry that found no effect of passive smoke. True enough—the study, funded by the Center for Indoor Air Research (CIAR), was published in the *British Medical Journal* (May 17, 2003). It reported further follow up of more than 115,000 individuals who had been examined for effects of passive smoking over a period of many years. The American Cancer Society (ACS) had started the study in 1959. Kabat and his coauthor James Enstrom tried to obtain funding for this study from several sources, including the ACS, and were turned down. Kabat makes it clear that CIAR had absolutely no influence over the study at any time and was not even given a copy of the paper. They, like everyone else, saw it upon publication. The paper was roundly attacked by the American Cancer Society and its supporters. Letters poured into the *British Medical Journal.* But the great majority simply raged at the authors without making any attempt to criticize the paper on scientific grounds.

Kabat quite properly calls this response scientific McCarthyism. He shows that agencies like the ACS and state and federal environmental protection agencies have willfully distorted the science of second-hand smoke to push the otherwise laudable goal of banning smoking in public places. In one case the Massachusetts Lung Association attempted to suppress publication of a study that did not support its position that second-hand smoke is dangerous, but "Harvard University had a firm policy" (p. 163) that allowed the paper to be published. These attempts to distort the science to support a particular policy, something done for years by the tobacco industry when it came to the dangers of actual smoking, can properly be called a "betrayal of science." This book, especially this chapter, should be read by anyone interested in how political pressure can change not only what science gets funded but how science is misrepresented even in official documents that should be objective. □



An Apologia with a Transparent Strategy

PETER LAMAL

The Democratic Virtues of the Christian Right.
By Jon A. Shields. Princeton University Press, 2009.
ISBN 978-0691137407. 198 pp. Hardcover, $29.95.

The basic themes of Jon Shields's new book *The Democratic Virtues of the Christian Right* are the importance of deliberative democracy, democratic education in the evangelical Christian Right, and participatory democracy. Considering these themes shows us, says Shields, how in just a few election cycles members of the Christian Right "went from being the least knowledgeable, partisan, and active citizens to among the most politically sophisticated" (115). The active involvement in politics by evangelical conservatives came later, after the Reagan Revolution, and was also more dramatic than many observers reported. Millions of new evangelical voters were not brought into politics until the 1990s. How did this happen?

Shields believes that we do not know very much about the workings of Christian Right (or Religious Right; Shields uses the terms interchangeably) organizations and that even less study has been directed at how religious activists behave in the public square. Furthermore, no systematic attention has been given to the central subject of this book, namely, how Christian Right leaders shape the behavior of their followers. What Shields writes is based on interviews, participant observation, survey data, and media provided by Christian Right leaders.

The Christian Right is said to have made positive contributions to America's participatory democracy by mobilizing conservative evangelicals, who had been one of the most politically alienated groups in twentieth-century America. Furthermore, Shields argues that the vast majority of Christian Right leaders have sought to develop deliberative norms in their activists. These include the practice of civility and respect when interacting with those who disagree with the Christian Right, enabling true dialogue by listening to and asking questions of those who disagree with you, and abstaining from making appeals to theology.

An example of this approach is a conference on homosexuality held by the conservative organization Focus on the Family in Charlotte in February 2009. In a newspaper article two days before the conference, the director of "gender issues" for Focus on the Family wrote of "our heart for those living homosexually." In more than fifty cities the director writes that their message has been "one of hope, not hatred, as our critics charge . . . there is nothing intolerant about what we have to say." She goes on to maintain that after their conferences it is common for those who disagree with them "to note that they see no sign of anger toward homosexuals during our conference. . . .The hearts of those who serve at Focus are full of such compassion, grace and love."

In response to this article, the founder of Truth Wins Out wrote a newspaper article maintaining that the Focus on the Family conference offered "false hope and broken promises." He pointed out that every mainstream American medical and mental health organization says that attempts to change sexual orientation can cause "anxiety, depression and self-destructive behavior." The article's author says that Focus on the Family has distorted scientists' research and that eight scientists have accused the organization of manipulating their studies.

The strategy of winning converts to the Religious Right by a positive approach embodying love for all people and a willingness to engage in civil discussion is exemplified by an ad in the *Charlotte Observer* newspaper. The ad, for a Baptist Church, includes a large picture of Jesus above which in large print is:

> He died to /
> Take away your sins. /
> Not your mind.

This was followed by: "You don't have to stop thinking when you walk into our church. Come and join us in an atmosphere where faith and thought exist together in a spirit of fellowship."

Yet such deliberative norms do not automatically result in Christian Right members becoming deliberative democrats. Christian evangelicals are not skeptics whose beliefs might be changed. In contrast, many evangelicals become even more confident in their opinions because their participation in the public square includes selecting scientific evidence and philosophical views that supplement what they believe to be biblical truths.

Rational deliberation is also compromised in another way. In teaching

Among the examples of Religious Right activities he describes are "sidewalk counseling" at abortion clinics and group visits to college campuses.

Peter Lamal is a fellow of the Division of Behavior Analysis of the American Psychological Association. His book reviews have been published in academic journals and the Charlotte Observer *newspaper, as well as* The Humanist *and* SKEPTICAL INQUIRER *magazines.*

activists how to deal effectively with the public, evangelical leaders encourage activists' commitments through passionate and strident exhortations. Such polemics underscore the fundamental tension between the ideals of participation and deliberation. Nevertheless, Shields obviously prefers those who engage in deliberative democracy contrasted with such militant fundamentalists as those of the late Moral Majority and of the anti-choice Operation Rescue. This contrast leads Shields to declare that "deliberative moderation dominates the Christian Right (p. 3)." At the same time, however, he says we need to be more tolerant of the excesses that often accompany moral conflict if we value participation, but he fails to spell out what, if any, limits there should be to such excesses.

A chapter concerned with varieties of "pro-life" activism and another concerned with deliberation and abortion politics provide in-practice details about the themes of deliberative democracy, democratic education in the Christian Right, and participatory democracy. Among the examples of Religious Right activities he describes are "sidewalk counseling" at abortion clinics and group visits to college campuses.

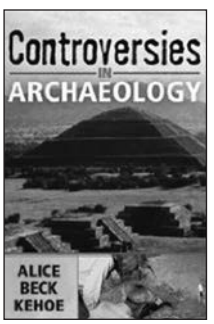
This book is an apologia for the Christian Right. Negative connotations abound when referring to academicians, the "hostile media," "media elite," and "liberal elites." He believes these groups unfairly and negatively describe the beliefs and behaviors of the Christian Right. Furthermore, the "democratic virtues" that Shields ascribes to the Religious Right can be more accurately described as components of a strategy aimed at converting others to subscribe to its beliefs. These "virtues" are thus a means to an end, and it is critical to continually bear in mind that the end the Religious Right seeks is a society totally at variance with the humanistic, liberal (in the political philosophy sense), truth-seeking society that we continually seek to achieve; this is evident from the book's cover.

The Religious Right's strategy becomes even more important for it in view of evangelicals' inability to persuade others to vote their way in the 2008 elections. The strategy is clearly an attempt to increase its ranks by taking an approach that appeals to more people than the traditional hell-and-damnation rantings. Also underscoring the strategy's importance are survey results indicating that the U.S. is much less religious than many Americans may believe. For example, a 2008 survey found that in response to "What is your religion, if any?" only one response increased in every state: "None." □

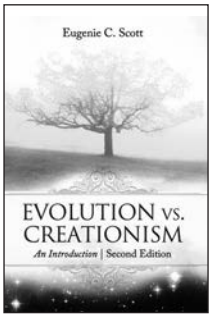
NEW BOOKS

Listing does not preclude future review.

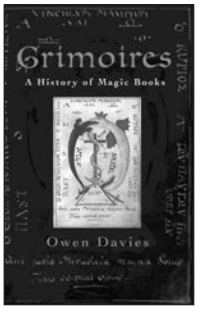
CONTROVERSIES IN ARCHAEOLOGY. Alice Beck Kehoe. Left Coast Press, Walnut Creek, California, 2008. 255 pp. Paperback, $29.95. From Atlantis to ancient astronauts, pyramid power to Stonehenge, there seems to be no end to archaeology-related woo-woo claims. Alice Beck Kehoe, a professor of anthropology at the University of Wisconsin, delves into these mysteries and more in her new book. Kehoe has little patience for the pseudoscience that pollutes her profession: "To keep your job as a scientist, you need to make a chain of steps from data to explanation, with each step being a process that others could replicate. On the other hand, to make wads of money, you wouldn't waste your time setting out a logical chain from data to explanation. You'd just start writing, keeping your sentences short and snappy, and labeling pictures, 'Extraterrestrial astronaut taking off from Maya palace.'" This is of course a reference to the best-selling (and thoroughly discredited) work of Erich Von Däniken's infamous archaeological "evidence" for ancient astronauts. Kehoe is suitably skeptical, knows her stuff, and covers a lot of ground, though some topics deserved a much more in-depth treatment (Atlantis, the Great Pyramid, and Stonehenge get only a few pages each). —B.R.



EVOLUTION VS. CREATIONISM: An Introduction, Second Edition. Eugenie C. Scott. Foreword by Niles Eldredge. Foreword to Second Edition by Judge John E. Jones III. Greenwood Press, Westport, Connecticut, 2009. 351 pp. Hardcover, $49.95. A welcome second edition with seventy new pages of material, including a new foreword by the judge in the landmark Dover case, of what is probably the best single readable reference source about the longstanding evolution and creationism controversy. The author's intention is to provide a broad perspective that includes historical, legal, educational, political, scientific, and religious analyses. Divided into three sections: Science, Evolution, Religion, and Creationism; A History of the Creationism/Evolution Controversy; and Selections from the Literature. The second section has a new chapter on "Testing Intelligent Design and Evidence Against Evolution in the Courts" that encompasses recent court cases. The expanded final section provides valuable source materials, legal decisions, selected article reprints, etc. Cosmology, astronomy, and geology get a useful chapter here, and there is a new chapter on issues involving the media and public opinion—pertinent since this is in large part a controversy involving public perception and manipulation of opinion. —K.F.

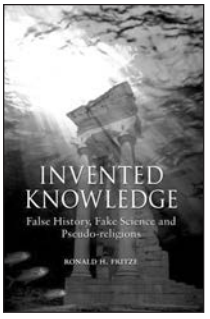


GRIMOIRES: A History of Magic Books. Owen Davies. Oxford University Press, New York, 2009. 384 pp. Hardcover, $29.95. Davies, a Reader in Social History at the University of Hertfordshire, provides a fascinating look at magic books—not tomes of legerdemain or illusions but repositories of forbidden knowledge revealing how to make powerful talismans and protective

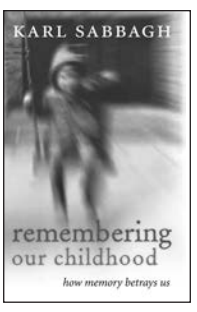


amulets, cast spells, and ward off evil. Their origins are both global and shrouded in mystery, as Davies traces the historical, social, and political influences that grimoires have had over the past few centuries. Davies notes that in 1725 a French book was printed that claimed to reveal the secrets of Moses, and 300 years before that books circulated claiming to provide spells for how to walk on water, in imitation of Jesus. (It's not reported whether the spell was successful.) A fascinating history of magic books whose influence can be seen in everything from the writings of Aleister Crowley and H.P. Lovecraft to *Buffy the Vampire Slayer*. —B.R.

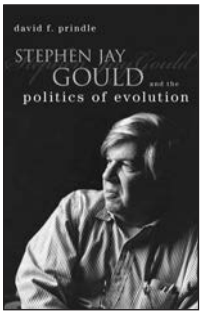
INVENTED KNOWLEDGE: False History, Fake Science, and Pseudo-Religions. Ronald H. Fritze. University of Chicago Press, 2009. 312 pp. Hardcover, $29.95. Were the Chinese the first to discover America in 1421? Did Jesus and Mary Magdalene have children together? Did extraterrestrials visit Earth during prehistory and teach humans how to build pyramids and stone structures? These are a few of the controversial claims Fritze (professor of history and dean of Arts and Science, Athens State University) investigates in this book. He explores the world of pseudohistory and sifts through fact, speculation, and pure fiction behind lost continents, ancient super-civilizations, and conspiratorial cover-ups—as well as the revisionist historical foundations behind religions such as the Nation of Islam and the Church of Jesus Christ of Latter-Day Saints. Fritze also includes a final-chapter case study of the Black Athena controversy. —K.F.



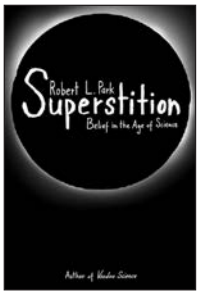
REMEMBERING OUR CHILDHOOD: How Memory Betrays Us. Karl Sabbagh. Oxford University Press, New York, 2009. 220 pp. Hardcover, $29.95. Journalist Karl Sabbagh explores the frailty of memory and reviews cognitive and scientific evidence for the veracity of early childhood memories. He concludes that "It is likely that the earliest memories, particularly if they are based on fleeting images or sounds . . . could well be genuine. On the other hand, narrative memories from early on—little stories about who did what to whom—are unlikely to be pure unmediated memory" (p. 50). The author tackles a variety of memory-related issues, including implanted memories, "repressed memories" (such as of early childhood sexual abuse), and dream interpretation. Sabbagh chillingly reports that a survey of American Psychological Association therapists found that nearly one-third thought that it was appropriate to refer clients who had no memory of being sexually abused to a sexual abuse survivors' group (where, as the author notes, social pressure and mutual reinforcement might lead them to falsely believe they had been abused). *Remembering Our Childhood* does not offer groundbreaking insights into the topic of false and recovered memories, but it does provide a very good overview of the issues and research done by people like Elizabeth Loftus, Jennifer Frey, Richard McNally, and others. —B.R.



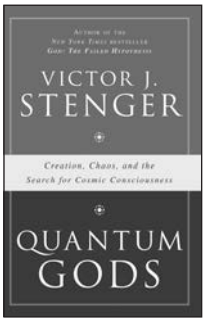
STEPHEN JAY GOULD AND THE POLITICS OF EVOLUTION. David F. Prindle. Prometheus Books, Amherst, New York, 2009. 240 pp. Hardcover, $26.98. Many people have written about the late evolutionary biologist Stephen Jay Gould's science (he made original contributions to science, and his essays educated and charmed millions), and some have written of his politics. But this book professes to be the first to explore Gould's science and politics together as a consistent whole. Political scientist David F. Prindle (University of Texas at Austin) argues that Gould's mind worked along two simultaneous tracks—the scientific and the political. He made genuine scientific contributions, but all his concepts and arguments likewise had political implications. One example is Gould's emphasis on contingency never allowing the "tape of evolution" to be replayed again the same way—an attack on hubris that lent weight to his political argument that people should treat nature with more respect and restraint. Prindle evaluates Gould's "punctuated equilibrium," his stances on sociobiology and intelligent testing, his "separate Magisteriums" argument for science and religion, and the claims that Gould was a closet Marxist, which Prindle disputes. He repeatedly emphasizes that Gould's science cannot be understood without understanding his politics. —K.F.



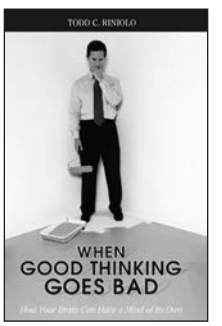
SUPERSTITION: Belief in the Age of Science. Robert L. Park. Princeton University Press, Princeton, New Jersey, 2008. 230 pp. Hardback, $24.95. Park, the University of Maryland physicist and writer of the acerbic "What's New" electronic newsletter that chronicles abuses of science, here follows up his 2000 book *Voodoo Science* with his latest book-length take on all manner of superstition. He begins with religion, the Templeton Prize, and the anthropic principle and quickly goes on from there. Intelligent design, studies that profess to prove the power of prayer (some of them fraudulent), parapsychology, homeopathy, acupuncture, quantum mysticism, New Age energy-healing claims, quests for the soul and the afterlife, and dozens of other controversies familiar to SI readers and expressed in Park's invitingly personal, pithy style yield under his sword of science and reason. —K.F.



QUANTUM GODS: Creation, Chaos, and the Search for Cosmic Consciousness. Victor J. Stenger. Prometheus Books, Amherst, New York, 2009. 264 pp. Hardcover, $26.98. Physicist, skeptic, and author Stenger (*God: The Failed Hypothesis*) here returns to the theme of his 1995 book *The Unconscious Quantum* to deal with persistent questions at the interface of quantum physics and popular philosophy: Does quantum mechanics show a connection between the human mind and the cosmos? Are our brains tuned into a "cosmic consciousness" that pervades the universe? Stenger examines the various contentions made in these areas and provides a carefully reasoned analysis of popular theories that attempt to link modern physics and spirituality. He shows what modern findings in physics actually mean in contrast to credulous claims made by believers in search of meaning. He also discusses a new kind of deism and notes that its "God" is a far cry from traditional religious ideas of God and, in effect, may as well not exist. —K.F.



WHEN GOOD THINKING GOES BAD: How Your Brain Can Have a Mind of Its Own. Todd C. Riniolo. Prometheus Books, Amherst, New York, 2008. A psychologist (Medaille College) argues that critical thinking is too often avoided not just by the general public but also by scientists, scholars, and other professionals. No one is immune to the hazard of not thinking critically, he says, and he offers a provocative guide, first with four chapters on hallmarks of critically evaluating claims (example: why strange coincidences are normal and why the critical thinker is wary of secondhand sources). He follows that with a five-chapter section on the evolution of inconsistent critical thinking. He ends with a five-chapter section discussing at some length examples of what he considers inconsistent critical thinking and the influence of our beliefs. Here he examines some specific topics that he believes have been given a too uncritical treatment: global warming (which he compares to psychic claims), politics, multicultural claims, and economics. He hopes to provide an appreciation for the fact that we all have biases and that there can be a difference between the critical thinker's ability and performance (in objectively implementing skeptical skills). —K.F.



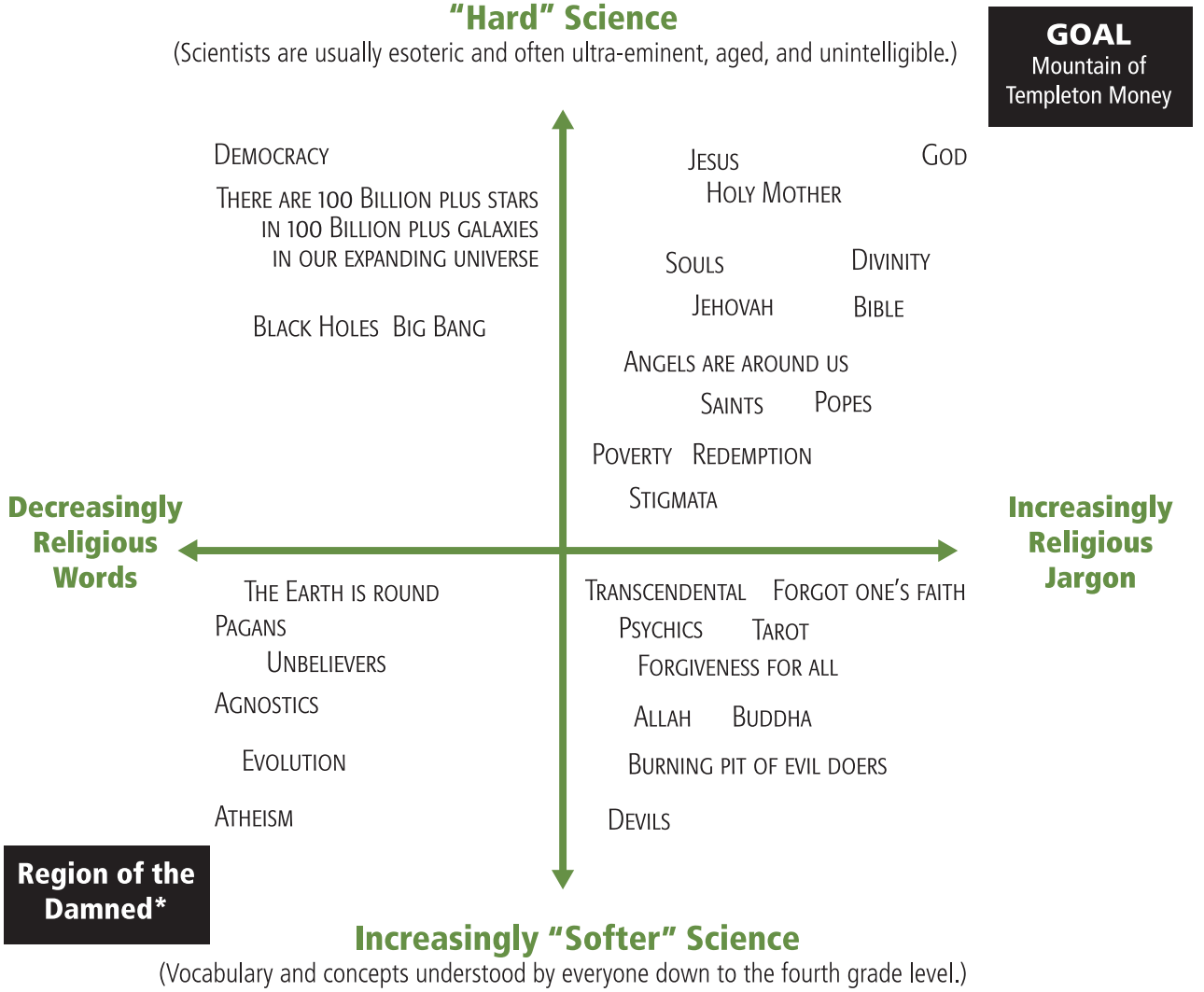
—Kendrick Frazier and Benjamin Radford

A Graphic Guide to Grabbing a Precious Pro-Religion Prize

JOEL KIRSCHBAUM

Lord Templeton established a foundation that grants various sums to advance religion, in particular Christianity. The crown jewel award is an annual cash prize that is readjusted annually to ensure that it is always worth more than the Nobel Prize. Lord Templeton, from Tennessee, believed that religion and religious advocacy is more important than peace, medicine, or the myriad of other minor and mundane human activities that Alfred Nobel thought significant.

The Templeton Prize, presently worth U.K. £1,000,000, was originally to be awarded in order to ". . . expand human perceptions of divinity and to help in the acceleration of divine creativity." It is now awarded to a prominent person "who has made an exceptional contribution to affirming life's spiritual dimen-



*Includes Wiccans, voodoo practitioners, Scientologists, shamans, Santeria, seers, polygamist Mormons, astrologists, animalism practitioners, reincarnationists, trans-incarnationists, palm readers, and penicillin-is-poison Christian Scientists.

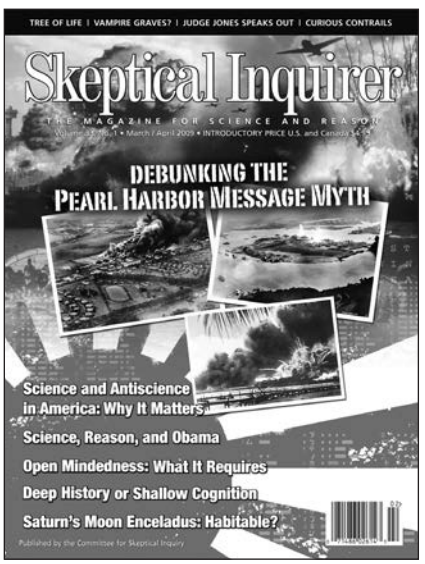
sion, whether through insight, discovery, or practical works." The most recent winner, announced in March, is French quantum physicist/philosopher Bernard d'Espagnat, who said, ". . . science cannot reveal anything certain about the nature of being, it cannot tell us with certainty what it is not," and "Mystery is not something negative that has to be eliminated." Although each of d'Espagnat's individual words have meaning, altogether they don't make sense to this realist, although they apparently overwhelmingly impressed the Templeton Prize judges. Thus, I conclude that the strategy for winning the million pounds sterling is to use several unrelated but significant scientific words in conjunction with some religious jargon that sounds significant, soulful, and spiritual. Below are some possible winning statements for your modification and use that appear as intelligible as past prize winners :

- The perfect mathematical symmetry of viruses proves God's mercy and power
- The majestic series of rings and moons around Saturn were formed the first Easter
- Our planet needs additional populations to provide prayers of heavenly praise now and more souls later
- The expanding universe and accelerating Hubble constant proves God is infinite and has dominion over all quanta of luminescence and quintessence
- The light generated by suns when hydrogen is fused to helium illuminates the righteous path of worthy souls to heaven
- God's love for His creations resists elongation and absorption into the event horizon of the black hole at the centrum of our galaxy
- The mechanics of miracles involve divine deformations of the space-time continuum

The accompanying plot, akin to a compass, is of the vocabulary words that will aid Templeton Foundation treasure trove seekers in securing cash.

Joel Kirschbaum, PhD, is a retired chemist who has published about seventy scientific papers and about fifty additional science-humor essays and articles for both conventional publishers such as Dow-Jones, Inc., and for The Journal of Irreproducible Results. *E-mail: joelk.inst.behav@prodigy.net.*

LETTERS TO THE EDITOR


TREE OF LIFE | VAMPIRE GRAVES? | JUDGE JONES SPEAKS OUT | CURIOUS CONTRAILS
Skeptical Inquirer
THE MAGAZINE FOR SCIENCE AND REASON
DEBUNKING THE PEARL HARBOR MESSAGE MYTH
Science and Antiscience in America: Why It Matters
Science, Reason, and Obama
Open Mindedness: What It Requires
Deep History or Shallow Cognition
Saturn's Moon Enceladus: Habitable?

The 'Winds Message' Controversy

I read with some interest your special report on Capt. Safford and the 'Winds Execute Message' in the March/April 2009 issue of SKEPTICAL INQUIRER because I've interviewed on my radio program a historian who some might mislabel a "conspiracy theorist" or revisionist (as if revising the history so that the truth is more clear when new evidence is made available is a bad thing).

In his book he makes clear that Safford was not the only person who read that incoming message sometime between December 3 and 5, and that others included Admiral Noyes, an army intelligence person named Sadtler, Officer Ralph Briggs, Thomas Mackie of Navy Intelligence, Commander Cedric Brown, Lt. H.C. Dixon of the British Navy, Admiral Royal Ingersoll, and Captain Kramer.

Briggs was the person who went on record to say *he* was the one who intercepted the message. Kramer, when questioned by the court after December 7 about the pre-December 7 message, was asked what those who worked with him thought about the message. Kramer said: "This is very simple language, and there was no doubt whatsoever." He said he was "quite certain" the message was "Higashi no kase ame" (indicating a coming attack on the U.S.).

Another person, Sonnett, was the person whose job it was to try to pin this evidence on Safford alone and went so far as to try to get Safford put in a psychiatric hospital for "hallucinations," as he also tried to do to Kramer when Kramer backed Safford's story.

I think you should ask historian George Victor to write a response to your special report.

Barry F. Seidman, Executive Producer
Equal Time for Freethought
www.EqualTimeForFreethought.org

Robert Hanyok, lead author of the National Security Agency report on the 'Winds Message' controversy, subject of the SI special report, responds:

Here is my take on Seidman's letter: (1) It is obvious that he did not read my book. His counterarguments, as such, are simply to restate the position taken by the conspiracists on this issue. In reality, I have a section in my book, "Who Saw the Winds Execute Intercept or Translation," in which I discuss the various claims made for who saw what and when (pp. 74–76). The only one I did not discuss in my

*book is Lt. Dixon. He is featured in the discredited Rusbridger work (*Betrayal at Pearl Harbor*). Dixon claimed he saw the "two-part message and could not understand why the Americans were fooled." The problem is that Dixon is describing the two set-up messages. The Execute was a simple phrase repeated twice in a newscast. (2) George Victor's* The Pearl Harbor Myth *is a mistake-riddled book. It is filled with basic factual errors, manipulated sources, and "phantom" sources, as well.*

I first became aware of the false rumors regarding the "disregard" of Pearl Harbor attack warnings by the Roosevelt administration in the late 1960s. I was a navy pilot (at Kirtland AFB and later Texas), and I and most of my colleagues regarded these rumors as political propaganda.

In the last few decades, anti-Roosevelt allegations have become increasingly numerous and strident. There seems to be a cabal that hates FDR almost as much as Hitler.

If you compare the statements of the Atlantic Charter of 1941 with the actions of our government in the last few decades, the change in paradigm becomes apparent.

The reason that the Bush/Reagan administrations have kept this FDR rumor alive is that at that time, they would have ignored and covered up warnings of the impending attack so as to serve their own ends, even with the certainty that numerous people would be killed, most of them Americans.

Thus we have a whole new viewpoint for examining the facts regarding the warnings of the attacks on September 11, 2001, as well as the aims and actions of the regime then in power and their later acts.

David G. Hill
Commander, USNR-Ret
Kaneohe, Hawaii

Kendrick Frazier's article on the "Winds" messages contained at least two errors of fact in an otherwise informative article. *USS Missouri* was laid down in June 1941 in New York and not launched until 1944 and thus could not have been at Pearl Harbor in December 1941 to be damaged as the caption states on page 29. The sidebar on page 30 claims that Purple was a Japanese cipher machine, when in fact it was the color coding for the American cipher workbooks on Japanese diplomatic code in Hawaii from about 1940 forward.

Though relatively innocuous, this is one way that conspiracy wing nuts bedevil us in the historical sciences: by taking small errors of fact in existing histories and compounding them into huge organs of deception for nefarious (but poorly defined) purposes.

In our book, *What Were They Thinking: A Fresh Look at Japan at War*, my co-author Lee A. Rochwerger and I examine Japan's brilliant execution of a poor attack plan in the context of Japanese wrongheaded expectations for Western behavior. When we looked at most of the conspiracy theories surrounding Pearl Harbor we found that few use the Winds messages for the reasons Frazier states: there wasn't anything in them. Most theorists use the "Roosevelt knew" fallacy derived from Charles Beard's 1946 anti-FDR polemical work and the work of others (including Captain Safford) whose political agendas and hurt feelings over being passed over for promotion (as Safford was) drove most of their ideas.

John D. Beatty
JDB Communications, LLC
Milwaukee, Wisconsin

While the piece concerning debunking the Pearl Harbor message myth was very well done and informative, there was a mistake regarding the photo of Battleship Row. In the photo the battleship *Missouri* can be seen and the caption reads, "The USS *Missouri*, at left center, was damaged during the attack." The *Missouri*, or *Mighty MO* as she was also known, was the scene of a very critical event during World War Two, but she was not present at the attack on Pearl Harbor. Point of fact, she hadn't even joined the fleet as of December 7, 1941. The *Missouri* was the site of the Japanese surrender ending the war in the Pacific and as such she is moored just forward of the *Arizona*'s wreck and memorial. The two ships then represent the beginning and the end of the war for America.

Keep up the good work, and I sometimes wonder if you don't throw things like this in just to make sure that we are paying attention.

Mark Lehde
majelehde@yahoo.com

We received at least fifty letters and messages noting the embarrassing error about the USS Missouri *in the photo caption. We ran a correction in our last issue (May/June 2009, page 11), but some further explanation may be warranted. As you might guess, the photo and caption weren't part of the original article; they were added in final layout as an illustration. When this photo, taken only a few months earlier, became available to our editorial/production department, the staff member tasked to write the caption checked a detailed modern map of Pearl Harbor on the Web and saw references to both a USS* Arizona *Memorial and a USS* Missouri *Memorial and made an incorrect assumption that both ships were present during the attack (also the caption didn't make clear that this was a 2008 photo, not a pre-attack one). The rest of us all failed to notice the error in page proofs. We've established some new editorial production processes to prevent this kind of problem from occurring.*

By the way, the entire NSA "West Wind Clear" report (327 pp) is now on the Web as a pdf file (12 MB) at www.nsa.gov/about/_files/cryptologic_heritage/publications/wwii/west_wind_clear.pdf.

—Kendrick Frazier, Editor

Science, Reason, and Obama

I read with much pleasure your commentary, "Science, Reason, and the Obama Administration" (March/April 2009). It describes well the hopeful signs that Obama will take a more favorable approach to what science and technology has to offer. Several of the scientists he has chosen for leadership positions sound outstanding.

As essential to the intellectual infrastructure of science and technology is math and science education. Your commentary notes that our secondary-school students are improving in these areas but could do better.

Your commentary omitted mentioning one important element for the advancement of the intellectual infrastructure of science and math education—metrication. The United States needs to adopt the metric system, which is the language of scientific measurement and the common system of measurement in the rest of the world. For the advancement of science in America, we must learn to Think Metric!

Metrication is the fourth favorite suggestion on the Web site www.obamacto.org for a chief technical officer in the Obama administration to pursue. For more information on metrication, contact the U.S. Metric Association (www.lamar.colostate.edu/~hillger/).

David W. Briggs
Marion, Massachusetts

Just a note to tell you how much I enjoyed and appreciated your commentary on "Science, Reason, and the Obama Administration." Your article profiles a president who is guided more by science and reason than by faith and gut instinct—the complete antithesis of the operating mode of our forty-third president, George W. Bush. The actions and words of George Bush over the past eight years disturbed me so much that I could not even write my autobiography without occasionally referring to some of the nonsensical decisions made by the Bush

administration.

Hopefully, the election of Barack Obama as our forty-fourth president will begin a movement based on science and reason, benefiting mankind worldwide.

Thank you for taking a stand in evaluating the mind and character of a new kind of president who shows promise of rising above "politics as usual" in leading the free world.

Samuel Homola
Panama City, Florida

As I read the article on the Obama Administration I found myself astounded that a magazine that purports to be "skeptical" could include such a puff piece on an untested president. It was particularly disturbing that the editor of the magazine was the author of the piece. "He exhibits a welcome centrist, moderate, pragmatic outlook that seems to eschew ideological extremes on either side of the political spectrum." His voting record in the Senate did not exhibit that. His *Audacity of Hope* did articulate conservative positions but clearly rejected them in favor of liberal positions.

If we are to be skeptical of claims about UFOs, ghosts, ESP, and so on, can we afford to check our skepticism at the door when dealing with politicians? The press avoided any serious vetting of Obama before the election, but the evidence that was available did not point to a centrist, moderate outlook. I am grateful that our new president is not a creationist, but I am very apprehensive about many other things.

Robin McMeeking
Pinckney, Michigan

As a long-time subscriber, I was deeply shocked by the omission of the halo from the image of Barack Obama on page 13 of your March/April 2009 issue. Now, this may have been a mere oversight. Let us hope that it was. But if any such mistakes occur again, readers may begin to doubt that you are really the independent, hard-headed skeptics you purport to be.

Larry G. Blaine
Plymouth, New Hampshire

Open-Mindedness

I enjoyed William Hare's recent article "What Open-Mindedness Requires" (March/April 2009). As a former high-school science teacher and a long-time reader of this magazine, there is probably no question in the English language more irritating to me than "Are you a skeptic or are you open-minded?" But how to explain to a class of high-school students exactly what is wrong with such a question?

A method I eventually discovered was to put a financial spin on the subject. It is amazing how quickly that distinction between "skeptical" and "open-minded" dissolves when money is involved.

For instance: You've received an e-mail from someone claiming to be a bank president in Burkina Faso. He says he has $17 million in an account that he would like to transfer to you. He only needs a small sum of money up front to help with the paper work. Would you do it? It might be true! Keep an open mind!

Examples such as these helped show my students that insisting something "might be true" even though there is little or no evidence to support it isn't necessarily being open-minded. In fact, sometimes it's just being plain foolish.

Rand Higbee
Hager City, Wisconsin

Saturn's Moon Enceladus

Felix Wasiak's article "The Potential Habitable Zone on Saturn's Moon Enceladus" (March/April 2009) notes the struggle to find enough energy to keep the moon's underground ocean sufficiently warm. The mystery has been solved by the mathematical analysis of "strong ocean tidal flow" on such outer moons. Published in the December 11, 2008, *Nature* (Robert H. Tyler, "Strong ocean tidal flow and heating on moons of the outer planets"), the article reports a previously unconsidered tidal force due to obliquity that has the right form and frequency to resonantly excite large-amplitude waves in these oceans. For one moon, Europa, a resonance with an energy enhancement factor of 2,000 larger than that of the flow excited by the usually considered tidal forces is computed!

The "liquid" on Io is molten sulphur, and on Neptune's moon it is liquid nitrogen. Only the other moons of Jupiter and Saturn have water oceans and thus could support some form of life.

Phillip A. Hawley
Paonia, Colorado

I enjoyed Felix Wasiak's piece on Saturn's moon Enceladus. As we extend our exploration into space, it will only be a matter of time until we find living microbes and other organisms. With finding water on Mars, it would only be logical that other life does exist in the universe. The farther realms of the universe are probably where we would find intelligent life. At least we are not skeptical on life existing out there.

Paul Dale Roberts
Elk Grove, California

Deep History, Crystal Skulls

John Ray's article "Deep History or Shallow Cognition" (March/April 2009) has two mistakes. No single crystal skull has been found in South America. All crystal skulls deposited in museums and private collections came, allegedly, from Mexico and Belize. We know now that all those skulls were made during the nineteenth century in Europe (http://www.archaeology.org/0805/etc/indy.html). The golden "Mayan model airplane" is not Mayan but is from Colombia.

Joaquin Narvaez
Calgary, Alberta, Canada.

Science-Religion Debate

Another good SKEPTICAL INQUIRER issue! The first of many articles that caught my attention was Nichols's "Judge Jones and the Science/Religion Debate . . ." (News and Comment, March/April 2009). He rightly sets the groundwork in the first paragraph. Certainly, many "have trouble distinguishing 'evidence-based thoughts' from 'faith-based ideas.'" Perhaps this is because most people are confused that science and religion are answering different questions. The science is the what; religion is the why. Why does there need to be conflict? I do not believe that there needs to be a "problematic interaction of science and religion." The Renaissance men did not have a problem. Have we gotten "too smart"?

Both science (including philosophy) and religion attempt to answer our fundamental questions about origin, destiny, and purpose but from different perspectives.

Don Jones
San Jose, California

Avoiding the 'Explain This' Trap

While lauding Dale Beyerstein's follow-up column ("What Do Skeptics Need to Explain?" March/April 2009), I think another point should be emphasized. Simply, skeptics should neither explain everything nor think we need to.

There's an important reason for this.

One of the favorite "rationales" for a credulous believer is to assert that if you can't explain something via rational means his own irrational explanation must be accepted instead. When, as skeptics, we even *seem* to accept this premise, it augments the believer's feeling of security in his fallacy.

Instead, I think it's sometimes a much superior tack to say something along the lines of: "Well, let's suppose for argument's sake I have no idea—absolutely none whatsoever—how X can be explained. Does that fact, in itself, justify you in concluding your explanation must be the correct one?"

I can assure you, the above question is not one the credulous believer has ever asked himself. He's simply assumed that absent the appearance of a good rational explanation, his irrational one is justified. Sometimes all it takes is to ask this question for the person to see his fallacy. . . .

History is rife with a whole series of affairs where humans, ignorant of the rational explanation for something, assumed the irrational. Shouldn't we be smarter now, in light of history's lesson, and realize that simply because we lack a rational explanation, it is no basis for assuming some particular irrational explanation instead?

Sometimes the above is a more powerful (not to mention more pertinent) tool than the provision of a rational explanation.

Glade Ross
glade@rossware.net

Secret of the Wax Hands

Regarding Massimo Polidoro's recent article on the art of reproducing wax casts of hands in séances ("Ghostly Molds," March/April 2009), I would like to draw your readers' attention to Paul Gallico's 1964 novel *The Hand of Mary Constable*, in which this technique is explored. Gallico's premise, that a high-ranking British intelligence official is being manipulated by foreign agents through séances in which he believes he can communicate with his deceased fourteen-year-old daughter, is not only highly entertaining but also completely reveals the "secrets" behind the production of the wax hand.

Elizabeth Ketelle
Garden Valley, California

'Upcoding' Medical Conditions

In his follow-up article, "Critique of 'The Bipolar Bamboozle'" (March/April 2009), Dr. Nigel Bark said, "If you have to 'upcode' to ensure that these parents do not have to pay 'out of pocket' for the hospitalization of their child, so be it."

I was really surprised to read that. I don't know how to interpret that statement other than that Dr. Bark was approving of psychiatrists defrauding insurance companies!

Arnold Knepfer, MD
Corte Madera, California

Nigel Bark, MD, responds:

I accept that my statement is open to criticism; 'upcode' is the wrong term. The next sentence explains my meaning: that these children are very severely ill, desperately need hospitalization and treatment for which the parents have insurance. A deferred or unknown diagnosis might be more correct but may not get insurance coverage. And the insurance company will not pay a year or two later when it has become clear that it is Bipolar Disorder or Schizophrenia.

Whose Physics?

Kenneth W. Krause's review of Richard Muller's *Physics for Future Presidents* (March/April 2009) stated, "as the experts noted, because warming increases oceanic evaporation and because the extra water vapor falls as snow when it reaches Antarctica, global warming would actually increase the Antarctic ice mass." It is not clear who these supposed experts are, though I suspect they are related to Fox News's oft-quoted "some say."

Here in Wisconsin, we received record amounts of snow last winter. However, this snow did not add to any glacial ice masses here because when spring arrived, the snow actually melted, causing destructive floods across the state.

Wouldn't we expect global warming to melt the Antarctic ice mass only at the edges? Any additional snow in the colder interior would indeed add to the depth of the ice mass but only if it does not melt in the summer and if the mass is static. If the glacial mass is in motion, the extra weight would slightly increase its speed toward the warmer edges.

As we observe precipitation increasing, sea levels rising, and glaciers increasing speed, breaking away, and melting, it would be a very bizarre twist of logic to conclude that these phenomena prove that the earth is getting colder rather than hotter.

Pete Formiller
Madison, Wisconsin

In his book review Kenneth W. Krause implies that electric cars are infeasible because "as Muller points out, . . . pound for pound even the best batteries can store just one percent of the energy contained in gasoline." This is highly misleading. It ignores three things: (1) Gasoline engines are far less efficient than electric motors at turning the energy in their fuel into motion. (2) A complete gasoline engine and transmission are significantly heavier than an electric motor (which doesn't need a transmission). (3) An electric vehicle can make use of regenerative braking. Using modern batteries, an electric car is more like three or four times as heavy as a comparable gasoline-burning car.

The proper metric is cost per mile for a vehicle of a given cargo capacity, not the theoretical energy-to-weight ratio of the fuel. Factoring in the cost of climate change (famine from disruption of agriculture, sea level rise, loss of biodiversity, stronger storms) and the human cost and cost to the taxpayer of keeping the oil flowing from the Middle East, the utility of electric cars is far from "hyperbole."

In these days, we truly can't afford poorly considered remarks about energy technology.

R. Allen Gilliam
Winter Park, Florida

The letters column is a forum for views on matters raised in previous issues. **Letters should be no longer than 225 words.** Due to the volume of letters we receive, not all can be published. Send letters as e-mail text (not as attachments) to letters@csicop.org. In the subject line, provide an informative identification, e.g.: "Letter on Jones evolution article." Include your name and address at the end of the letter. You may also mail your letter to the editor to 944 Deer Dr. NE, Albuquerque, NM 87122, or fax it to 505-828-2080.

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CALIFORNIA. Sacramento Organization for Rational Thinking (SORT) Sacramento, CA. Ray Spangen-burg, co-founder. Tel.: 916-978-0321; e-mail: kitray@quiknet.com. PO Box 2215, Carmichael, CA 95609-2215 US. www.quiknet.com/~kitray/index1.html. **Bay Area Skeptics** (BAS) San Francisco—Bay Area. Tully McCarroll, Chair. Tel.: 415 927-1548; e-mail: tullyann@pacbell.net. PO Box 2443 Castro Valley, CA 94546-0443 US. www.BASkeptics.org. **Independent Investigations Group (IIG),** Center for Inquiry–*West*, 4773 Hollywood Blvd, Los Angeles, CA 90027 Tel.; 323-666-9797 ext. 159; Web site:www.iigwest.com. **Sacramento Skeptics Society**, Sacramento. Terry Sandbek, President. 4300 Auburn Blvd. Suite 206, Sacramento CA 95841. Tel.: 916 489-1774. E-mail: terry@sandbek.com. **San Diego Association for Rational Inquiry** (SDARI) President: Paul Wenger. Tel.: 858-292-5635. Program/general information 619-421-5844. Web site: www.sdari.org. Postal address: PO Box 623, La Jolla, CA 92038-0623.

COLORADO. The Denver Skeptics Meetup Group. Elaine Gilman, President. Skype address: elaine.gilman. 965 S. Miller Street, 302, Lakewood, CO 80226. Web site: http://skeptics.meetup.com/131/.

CONNECTICUT. New England Skeptical Society (NESS) New England. Steven Novella M.D., President. Tel.: 203-281-6277; e-mail: board@theness.com. 64 Cobblestone Dr., Hamden, CT 06518 US. www.theness.com.

D.C./MARYLAND. National Capital Area Skeptics NCAS, Maryland, D.C., Virginia. D.W. "Chip" Denman. Tel.: 301-587-3827. e-mail: ncas@ncas.org. PO Box 8428, Silver Spring, MD 20907-8428 US. http://www.ncas.org.

FLORIDA. Tampa Bay Skeptics (TBS) Tampa Bay, Florida. Gary Posner, Executive Director. Tel.: 813-849-7571; e-mail: tbs@cfiflorida.org; 5201 W. Kennedy Blvd., Suite 124, Tampa, FL 33609 US. www.tampabayskeptics.org. **The James Randi Educational Foundation.** James Randi, Director. Tel: (954)467-1112; e-mail jref@randi.org. 201 S.E. 12th St. (E. Davie Blvd.), Fort Lauderdale, FL 33316-1815. Web site: www.randi.org.

ILLINOIS. Rational Examination Association of Lincoln Land (REALL) Illinois. Bob Ladendorf, Chairman. Tel.: 217-546-3475; e-mail: chairman@reall.org. PO Box 20302, Springfield, IL 62708 US. www.reall.org.

KENTUCKY. Kentucky Assn. of Science Educators and Skeptics (KASES) Kentucky. 880 Albany Road, Lexington, KY 40502. Contact Fred Bach at e-mail: fredwbach@yahoo.com; Web site www.kases.org; or (859) 276-3343.

LOUISIANA. Baton Rouge Proponents of Rational Inquiry and Scientific Methods (BR-PRISM) Louisiana. Marge Schroth. Tel.: 225-766-4747. 425 Carriage Way, Baton Rouge, LA 70808 US.

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NEW MEXICO. New Mexicans for Science and Reason (NMSR) New Mexico. David E. Thomas, President. Tel.: 505-869-9250; e-mail: nmsrdave@swcp.com. PO Box 1017, Peralta, NM 87042 US. www.nmsr.org.

NEW YORK. New York Area Skeptics (NYASk) metropolitan NY area. Jeff Corey, President. 18 Woodland Street, Huntington, NY 11743, Tel: (631) 427-7262 e-mail: jcorey@liu.edu, Web site: www.nyask.com. **Inquiring Skeptics of Upper New York** (ISUNY) Upper New York. Michael Sofka, 8 Providence St., Albany, NY 12203 US. **Central New York Skeptics** (CNY Skeptics) Syracuse. Lisa Goodlin, President. Tel: (315) 446-3068; e-mail: info@cnyskeptics.org, Web site: cnyskeptics.org 201 Milnor Ave., Syracuse, NY 13224 US.

OHIO. Central Ohioans for Rational Inquiry (CORI) Central Ohio. Charlie Hazlett, President. Tel.: 614-878-2742; e-mail: charlie@hazlett.net. PO Box 282069, Columbus OH 43228 US. **South Shore Skeptics** (SSS) Cleveland and counties. Jim Kutz. Tel.: 440 942-5543; e-mail: jimkutz@earthlink.net. PO Box 5083, Cleveland, OH 44101 US. www.southshoreskeptics.org/. **Association for Rational Thought** (ART) Cincinnati. Roy Auerbach, president. Tel: 513-731-2774, e-mail: raa@cinci.rr.com. PO Box 12896, Cincinnati, OH 45212 US. www.cincinnati skeptics.org.

OREGON. Oregonians for Science and Reason (O4SR) Oregon. Jeanine DeNoma, president. Tel.: (541) 745-5026; e-mail: wilkinsa@peak.org; 39105 Military Rd., Monmouth, OR 97361 US. Web site: www.04SR.org.

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TEXAS. North Texas Skeptics NTS Dallas/Ft Worth area, John Blanton, Secretary. Tel.: 972-306-3187; e-mail: skeptic@ntskeptics.org. PO Box 111794, Carrollton, TX 75011-1794 US. www.ntskeptics.org.

VIRGINIA. Science & Reason, Hampton Rds., Virginia. Lawrence Weinstein, Old Dominion Univ.-Physics Dept., Norfolk, VA 23529 US.

WASHINGTON. Society for Sensible Explanations, Western Washington. Tad Cook, Secretary. E-mail: K7RA@arrl.net. PO Box 45792, Seattle, WA 98145-0792 US. http://seattleskeptics.org.

PUERTO RICO. Sociedad De Escépticos de Puerto Rico, Luis R. Ramos, President. 2505 Parque Terra Linda, Trujillo Alto, Puerto Rico 00976. Tel: 787-396-2395; e-mail: Lramos@escepticospr.com; Web site www.escepticor.com.

The organizations listed above have aims similar to those of the Committee for Skeptical Inquiry but are independent and autonomous. Representatives of these organizations cannot speak on behalf of CSI. Please send updates to Barry Karr, P.O. Box 703 Amherst NY 14226-0703.

International groups listings have been moved to our Web site: www.csicop.org

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